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FROM THE

ROYAL BOTANIC GARDEN,

EDINBURGH.

VOL. IX.

Including Numbers XLI-XLV.

1915-1916.

EDINBURGH:
PRINTED UNDER THE AUTHORITY OF HIS MAJESTY'S
STATIONERY OFFICE
By NEILL & CO., LIMITED,
At 212 Causewayside.

D.70

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H.M. STATIONERY OFFICE (Scottish Branch),
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Dates of the several Numbers of this Volume.

Number XLI, pp. 1–70 for April 1915.
Number XLII, pp. 71–144 for February 1916.
Number XLIII, pp. 145–206 for March 1916.
Numbers XLIV–XLV, pp. 207–320 for June 1916.

Wt. 4138/89—375—12/16.—N. & Co., Ltd. Gp. 10.

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Correction.

Page 190, line 20. *After* 'species' *insert* '(excepting *P. pusilla*, Wall.)'.

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New Species of Primula.

BY

PROFESSOR BAYLEY BALFOUR, F.R.S.

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1543 **Primula aemula,** Balf. fil. et Forrest.

Robusta epilosa efarinosa glaberrima. Folia rosulata floribus coaetanea basi squamis alabastri circumcincta magna ad 30 cm. longa ad 6 cm. lata carnosula anguste obovato-oblonga obtusa hic illic mucronulata minute denticulata in petiolum alatum haud distinctum deorsum attenuata utrinque laevissima subtus glauca venis primariis e costa media prominula acutissime adscendentibus. Scapus crassus ad 7 dm. altus verticillos 4–5 multifloros inter se remotos et umbellam terminalem gerens; bracteae virides a basi vaginata auriculata abrupte acuminatae quasi caudatae pedicellis breviores infimae ad 15 mm. longae supremae minores; pedicelli validi ad 3.5 cm. longi apice declinati, sub fructu erecti stricti ad 6 cm. longi anthopodio magno semilenticulari terminati. Calyx late campanulatus ad 1 cm. longus crassus tubo costis 5 viridibus vittato ad medium fissus lobis erectis adpressis a basi lanceolatis acuminatis haud hydathodo corneo terminatis. Corollae flavae aureo-oculatae tubus infundibuliformis supra stamina ampliatus ad 1.4 cm. longus calycem superans membranaceus extus nitidus intus annulo magno 5-lobato instructus infra stamina vix rugosus, limbi plani discus subpuberulus 3 mm. latus, lobi crassi oblongo-ovati ad 9 mm. longi 5 mm. lati integri obtusi mucronulati. Stamina antheris 2.5 mm. longis et connectivo brunneo, in flore brevistylo filamentis conspicuis applanatis 1.5 mm. longis orem tubi corollini versus inserta antherarum apicibus ultra annulum paullo exsertis, in flore longistylo filamentis inconspicuis prope medium tubi inserta apicibus antherarum circ. 5 mm. ab annulo remotis.

Ovarium globosum stylopodio non coronatum; stylus brevis vix calycem aequans, longus corollae tubo vix brevior; stigma capitatum purpureum lobulatum. Capsula magna ad 1.7 cm. longa calyce duplo-longior cylindrica crustacea extus longitudinaliter striata erubescens ab apice valvis 5–10 incrassatis dehiscens. Semina angulata subrhomboidea ad 1 mm. diam.; testa brunnea spongiosa.

Ex affinitate minus cognitae *P. reflexae*, Petitm. sed verticillis pluribus multifloris, bracteis basi non sacciformibus, calyce non nigro-striato, limbo corollino plano, lobis non rotundatis differt.

Yunnan:—Open mountain pasture on mountains of the Chungtien plateau. Alt. 11,000 ft. Lat. 27° 55′ N. Plant of 24–30 inches. Flowers bright yellow with a satiny sheen on exterior. G. Forrest. No. 10,687. July 1913; No. 11,284. Sept. 1913. In fruit. In Herb. Edin.

A magnificent species. It finds it nearest Chinese allies undoubtedly in *P. orbicularis*, Hemsley and *P. reflexa*, Petitm. These agree according to descriptions in having orbicular petals, and by that character should be at once diagnosed from *P. aemula*, Balf. fil. et Forrest. *P. orbicularis*, Hemsley is also a farinose species, which *P. aemula*, Balf. fil. et Forrest is not, and *P. reflexa*, Petitm. has reflexed petals as in *P. szechuanica*, Pax—a character not found in *P. aemula*, Balf. fil. et Forrest.

P. orbicularis, Hemsl. was discovered by Wilson in the region about Tatsien-lu, and from seed collected by him it was raised by Veitch & Son in 1906. The plant was figured in the Botanical Magazine under tab. 8135, and a dried specimen of the cultivated plant is preserved in the Kew Herbarium marked "Wilson 3003A?" I have not seen in any collection a native specimen Wilson 3003A, and, as the plant has died out of cultivation, this dried cultivated specimen is probably the only material representation of it. I have compared it with Forrest's plant here described, and there is no doubt about their distinctness.

P. reflexa, Petitm. is a more difficult subject with which to make comparison, as the species is little known. But Petitmengin's description is inapplicable to Forrest's plant conspicuously as regards the vegetative apparatus which is altogether different from that of *P. sikkimensis*, Hook.—which *P. reflexa*, Petitm. is said to resemble,—and then the saccate bracts of *P. reflexa*, Petitm. ought to separate it readily from *P. aemula*, Balf. fil. et Forrest.

Another yellow-flowered species, *P. tsetzouenensis*, Petitm. is described as having leaves cordiform at base and also saccate bracts—characters which do not suit *P. aemula*, Balf. fil. et Forrest.

1239 **Primula alsophila,** Balf. fil. et Farrer.

Sylvestris humicola stolonifera late stolonibus fragilibus radicantibus sub muscos repens. Folia petiolata ad 10 cm. longa 2–3 basi vaginantia rhizomatis corona exeuntia caetera evaginantia e stolonibus singulatim inter se remota orientia; lamina cordato-palmatifida ad 3 cm. longa ad 4 cm. lata 7-lobata lobis quadratis acutis acute tri-lobulatis margine piloso-ciliata sinu angusto utrinque sparsim pilosula laeto-viridis subtus pallidior; petiolus tenuis pilis albidis sparsissime obsitus. Scapus ad 15 cm. longus gracillimus infra sparsim albo-pilosus superne puberulus umbellam 2–3-floram gerens; bracteae 2–3 ad 6 mm. longae lineari-subulatae membranaceae puberulae; pedicelli filiformes ad 2 cm. longi minutissime sparsimque puberuli nunc purpurascentes; anthopodium turbinatum. Calyx ad 6 mm. longus late campanulatus sepalorum nervis centralibus paullo prominulis viridi-vittatus intervallis pallidioribus subpergamentaceis punctatis ultra medium fissus lobis divaricatis a basi lanceolato-acuminatis minutissime subpuberulis et ciliolatis viridibus nervo medio conspicuo. Corollae lilacinae tubus 1.2 cm. longus cylindricus membranaceus in flore brevistylo supra stamina ampliatus intus transverse rugosus annulatus annulo 10-lobato lobis per paria antipetalis deorsum concavis, limbi concavi discus 1.5 mm. latus, lobi imbricati obovati ad 7 mm. longi profunde fissi. Stamina filamentis latis basi expansis et antheris 1.5 mm. longis ad faucem tubi corollini antherarum apicibus fere exsertis inserta. Ovarium pyriforme; stylus brevis tubo calycino vix longior; stigma magnum discoideum.

Species sectionis Geranioidis habitu repente, foliis, umbella pauciflora satis distinguenda.

Tibet. Farrer and Purdom. No. 178. 1914. Banks of very deep moss and woodland decay, only in the very highest woodland zone of the Thibetan forests round the Bei Ling, at 11,000–12,000 ft., among the Pyrolas—*uniflora* and *rotundifolia*. A most dainty and charming plant, running freely underground, and forming carpets many yards across. Flowers July 21 (prime a little earlier); seed mid-October. In Herb. Edin.

This is a most delightful species, quite different from all others of the section Geranioides. The long creeping stolons with slight rooting system are most striking—suggestive of the growth-form of the plants with which it grows in the moss. Stolons occur in many Primulas, but I know of no other species with the type of stolon shown by this plant. That it is commensal might be surmised from its habit, and I find, as is usual in plants of its habitat, that its stolons are traversed by a mycelium. Whether, as is the case in *Pyrola*, *Malaxis*, and other like plants, the mycelium extends to the leaves, I have not material to

determine, but one may expect to find it there, and that the plant, like its comrades, has the capacity through its guest fungus of fixing for itself from the atmosphere its nitrogen supply.

1707 **Primula alta,** Balf. fil. et Forrest.

Multiceps puberula radicibus tenuibus et alabastri squamulis parvis vestita, foliis floribusque coetaneis. Folia rosulata ad 7 cm. longa ad 2.5 cm. lata obovata vel oblonga vel oblanceolata apice obtusa vel rotundata integra vel obscurissime denticulata in foliis vetustis venarum extremitate hydathodali rigido-setulosa margine subciliata utrinque molliter puberula costa media tenui venisque primariis inconspicuis deorsum in petiolum alatum lamina breviorem sensim attenuata. Scapus elatus gracilis ad 35 cm. altus apice plus minusve luteo-farinosus umbellam multifloram congestam gerens; bracteae submembranaceae plus minusve luteo-farinosae exteriores ad 5 mm. longae infra vaginam latam basi gibbosam formantes supra in caudiculam ligulatam obtusam purpurascentem subito contractae ; pedicelli bracteis breviores 3.5 mm. longi luteo-farinosi ; anthopodium turbinatum magnum flore abstrictum. Calyx 6 mm. longus poculiformis plus minusve luteo-farinosus ; tubus membranaceus tenuis albidus nunc purpurascens ultra medium fissus lobis a basi lanceolatis acutis ciliatis atropurpureis. Corollae limbus purpureus luteo-oculatus tubus flavidus vel rubescens ad 9 mm. longus cylindricus in flore brevistylo superne ampliatus extus glaber intus exannulatus supra stamina transverse rugosus infra membranaceus, limbi patuli vix 1 mm. lati discus puberulus, lobi ad 6.5 mm. longi obovati profunde bipartiti. Stamina filamentis brevissimis antheris 2 mm. longis, in flore longistylo basin tubi corollini versus inserta antherarum apicibus ab ore circ. 5 mm. remotis calycis lobis dimidio-breviora, in flore brevistylo supra medium inserta apicibus ab ore circ. 2.5 mm. remotis. Ovarium ovoideum ; stylus longus corollae tubo vix dimidio-brevior, brevis calyce dimidio-brevior ; stigma capitatum obconoideum depressum. Capsula ovoidea melichlora calyce inclusa valvis 5 ab apice dehiscens ; placenta stipitata globoso-ovoidea. Semina brunnea minuta 0.5 mm. diam. ; testa cellulis aeriferis corrugata.

Species Sectionis Denticulatae ex affinitate *P. radiatae*, Balf. fil. et Forrest sed foliis molliter pubescentibus fere integris, scapo elongato, calycis tubo membranaceo, et notis aliis segregata.

Yunnan. Moist pastureland. Hills N.W. of Tengyueh. Alt. 6000–7000 ft. Lat. 25° 10′ N. Plant of 9–15 inches. Flowers deep purplish blue. G. Forrest. No. 9679. February 1913. In Herb. Edin.

This is one of the southern forms of the widespread type of *P. denticulata*, Sm. and a very distinct one it is. Its small rosette of obovate puberulous leaves, from which a scape of great length for the size of the rosette ascends, gives it a well-marked character. The rhizome forms several rosettes, and there may be several scapes ascending from the same tuft. Its calyx has a curious membranous inflated appearance in dried specimens. It is the Chinese representative of the Himalayan *P. erosioides* (Watt), Balf. fil. et W. W. Sm.

Primula annulata, Balf. fil. et Ward.

Pusilla efarinosa rhizomate tenui ramoso late repente vestigiis foliorum vetustorum obtecto. Folia puberula rosulata ad 1.5 cm. longa 5 mm. lata spathulata vel oblongo-spathulata obtusa margine regulariter serrata vel serrato-lobata deorsum sensim in petiolum alatum lamina longiorem evaginantem attenuata. Scapus ad 3.5 cm. altus gracilis uniflorus puberulus; bracteae duae parvulae puberulae virides lanceolatae subulatae alternae superior major ad 2.5 mm. longa; pedicellus erectus ad 3.5 mm. longus puberulus; anthopodium parvum. Calyx 3.5 mm. longus campanulatus viridis puberulus ultra medium fissus lobis triangularibus vel oblongo-deltoideis obtusis vel acutis nunc obscure dentatis ciliatis. Corollae violaceae tubus ad 4 mm. longus calycem triente vel quadrante superans supra stamina ampliatus extus erubescens intus ad orem minute puberulus annulo prominulo lobato instructus, limbi discus puberulus brevissimus, lobi ad 3 mm. longi obcuneati ad medium divaricatim bipartiti. Stamina filamentis brevissimis antheris 0.5 mm. longis in flore longistylo ad medium tubi corollini inserta calyce inclusa. Ovarium sphaeroideum; stylus longus vix calyce longior stamina paullo superans. Capsula oblonga calyce vix aucto omnino inclusa; placenta columnaris.

Species pusilla aspectu *P. yunnanensis*, Franch., et *P. bellae*, Franch., sed ab hac oris barbati inopia ab illa corollae prominulo annulo recedit.

N.W. Yunnan. A-tun-tsu. On a limestone peak, 14,000 ft. June 1913. F. Kingdon Ward. No. 511. In Herb. Edin.

Two or three plants collected by Ward under the number 511 but without further designation are all that we have of this distinct species. The habit of the specimens shows that the plant is one of mossy loose soils such as we associate with *P. membranifolia*, Franch., *P. yunnanensis*, Franch., and like forms. The delicate rhizome branches are closely invested with the brown dry leaves of previous years. The small flower with a distinct prominent annulus not barbate is a characteristic feature of the plant.

1256 **Primula Calderiana,** Balf. fil. et Cooper.

Glabra efarinosa rhizomate parvo foliis longe petiolatis. Folia crassiuscula ad 12 cm. longa ad 1.5 cm. lata oblanceolata obtusa margine eroso-denticulata ecartilaginea utrinque punctis albidis quasi squamatis cellularum aeriferarum instructa subtus efoveolata costa media prominula deorsum in petiolum angustum alatum vaginantem sensim attenuata. Scapus ad 15 cm. altus gracilis infra glaber superne velutino-puberulus et purpurascens umbellam circa 12-floram gerens; bracteae ad 7 mm. longae a basi lata acuminatae nigro-purpureae velutino-puberulae; pedicelli filiformes flexiles nigro-purpurei puberuli ad 1.5 cm. longi; anthopodium magnum obconoideum. Calyx ad 6 mm. longus crassus campanulatus nigro-purpureus puberulus ad vel vix ultra medium fissus lobis ovatis obtusis. Corollae atropurpureae crassae tubus in flore brevistylo ad 1 cm. longus in longistylo 1 cm. longus calycem superans supra stamina subito ampliatus extus glaber intus cellulis aeriferis albidis notatus ad orem annulo magno luteo coronaeformi instructus infra stamina sub-membranaceus, limbi patuli discus puberulus circa 8 mm. latus, lobi circa 6 mm. longi et lati oblongi vel elliptici vel rotundati emarginati vel suberosi. Stamina magna filamentis 1 mm. longis ad basin latis et strumis intermediis corollinis annulum formantibus conjunctis, antheris 2 mm. longis, in flore longistylo fere ad medium tubi corollini inserta apicibus antherarum ab annulo circ. 2 mm. remotis, in flore brevistylo apicem tubi versus inserta apicibus circ. 0.5 mm. ab annulo remotis. Ovarium discoideum; stylus longus exsertus, brevis calyce brevior; stigma magnum ovoideum lobulatum.

Species ex affinitate *P. Gammieanae*, King forsan microforma, foliis oblanceolatis longioribus, floribus minoribus paucioribus, calyce nigro-purpureo non angulato, corolla extus non velutina et annuli forma distinguenda.

Sikkim. Above Changu. Alt. 12,500 ft. Purple; very variable, but common on peat hill tops. R. E. Cooper. No. 20. 28th June 1913. In Herb. Edin.

Sikkim. Changu. Alt. 12,000 ft. W. W. Smith. No. 3285. June 1910. In Herb. Calc.

One of the many forms which have been confused under the name *P. obtusifolia*, Royle. As matter of fact *P. obtusifolia*, Royle, is a rare plant of the North-West Himalayas, and all the plants from Sikkim and the East Himalaya which have been referred to *P. obtusifolia*, Royle, belong to other species.

1257 **Primula celsiaeformis,** Balf. fil.

Herbacea omnino subasperula pilis glandulisque obsita rhizomate parvo folia pauca petiolata et scapum racemosum

floribus inter se inaequaliter remotis vestitum emittente. Folia ad 24 cm. longa ; lamina ad 10 cm. longa ad 5 cm. lata oblonga vel oblongo-elliptica apice obtusa vel rotundata margine late crenulato-undulata crenis hydathodo corneo venarum denticulatis basi inaequilateralis latere uno subdecurrente altero rotundato sinum semi-cordatum formante costa media subtus prominula in sectione semicirculari cum venis primariis subpatulis percursa utrinque glandulis capitatis brevissime stipitatis obsita supra subbullata et pilis albis longis conspersa subtus subfavosa elevato-venulosa ad costam mediam et venas dense hirsuto-tomentosa ; petiolus ad 15 cm. longus lamina longior erectus plus minusve pubescens vel tomentosus vel sublanatus basi in vaginam parvam expansus. Scapus robustus ad 40 cm. longus hirsuto-tomentosus racemum longum cum floribus breviter pedicellatis irregulariter dispositis gerens ; bracteae ad 6 mm. longae lineari-subulatae vel anguste ligulatae apice subulatae glanduloso-pubescentes ; pedicelli stricti horizontales ad 1.5 cm. longi glanduloso-pubescentes ; anthopodium breve. Calyx obconicus ad 7 mm. longus foliaceus patens extus venuloso-reticulatus scabriusculus praesertim ad venas intus evenulosus vel venulis haud elevatis obscure subbullatus dense scabriusculo-puberulus ad medium fissus lobis late triangularibus ciliatis acutis plus minusve denticulatis. Corollae violaceae tubus ad 1.2 cm. longus cylindricus ad insertionem staminum constrictus extus intusque puberulus infra stamina paullo rugosus annulatus lobis 5 antipetalis crenulatim conjunctis, limbi discus poculiformis 3 mm. latus puberulus, lobi magni puberuli imbricati fere 1 cm. longi late obovati membranacei profunde angusteque fissi ciliolati. Stamina in flore longistylo filamentis conspicuis deorsum expansis et conjunctis pseudo-annulum formantibus antherisque 1.5 cm. longis infra medium tubi corollini inserta calyce breviora. Ovarium subdiscoideum muro ubique crustaceo ; stylus longus tenuis basi tumidus tubo corollino multo brevior ; stigma oblongum. Capsula globosa muro per totum incrassato stylum persistentem gerens calyce accreto ad 2 cm. longo late patente viridi foliaceo lobisque prominenter hydathodo corneo denticulatis inclusa.

Species ex affinitate *P. blattariformis*, Franch., foliis oblongis longe petiolatis subtus subfavosis glandulis capitatis plurimis vestitis, pedicellis longioribus, staminum insertione et notis aliis facile distinguenda.

West China. Rocks of Ta-tchai. Alt. 1800 ft. July. E. E. Maire. In Herb. Edin.

Quite a distinct purple-flowered species of the section Malvacea. From *P. blattariformis*, Franch. its nearest ally,

the long-stalked leaves distinguish it at sight, and there are many other easily recognised distinctions some of which I have noted above.

The Malvacea series of Primula is a compact and definite one. The species are all herbaceous forms with coarse leaves and long racemose inflorescences bearing flowers the calyx of which is diagnostic. It is foliaceous with well-developed reticulate venation more or less elevated, and the obconical tube expands into broad spreading lobes. In fruit the whole enlarges to form a platter-like expansion in the middle of which rests the globose capsule, the wall of which is thickened throughout its whole extent. The species now known—not all with completeness—are :—

P. malvacea, Franch., *P. blattariformis*, Franch., *P. Tenana*, Bonati, *P. celsiaeformis*, Balf. fil.—all purple or lilac-flowered forms.

P. bathangensis, Petitm., *P. pintchouanensis*, Petitm.—yellow-flowered forms.

At the time of the Primula Conference I included *P. neurocalyx*, Franch., in this section. I was wrong. It finds its nearest allies in the Mollis section.

Of *P. racemosa*, Bonati, which I had not seen at the time of the Conference, and which I upheld doubtfully as a species, I am now able to say, after an examination of a type specimen, that it is only a poor plant of *P. bathangensis*, Petitm. To make up for the casting out of his *P. racemosa*, Bonati, I console M. Bonati by raising his *P. blattariformis*, Franch., var. *Duclouxii*, Bonati, to the rank of a species. Unfortunately the name *Duclouxii* has been already attached by Petitmengin to a microform of *P. malacoides*, Franch. and the name *P. Tenana* now given to Bonati's plant is in honour of its collector Père Siméon Ten. M. Bonati sent to me a sheet of this for examination. The following is the diagnosis :—

P. Tenana, Bonati : *P. blattariformis*, Franch. var. *Duclouxii*, Bonati in Bull. Soc. Bot. France, sér. 4, ix (1909), 465.

A *P. blattariformi*, Franch. differt foliis mollibus haud scabridis brevibus (4–5 cm. longis, 3–4 cm. latis) basi cordatis profunde lobatis, lobis rotundis ; scapo scabrido haud lanato ; pedicellis longioribus (1–2 cm.) ; bracteis latioribus calyce multo brevioribus ; floribus minoribus ; forma calycis post anthesin ultra 2 cm. diametientis.

Yunnan. Makong near Tong-Tchouan. Coll. Siméon Ten. In Herb. Paris under Ducloux, No. 556.

An addition to the list of the Malvacea Primulas.

I have no further information about *P. pintchouanensis*, Petitm. and include it as a species with still a doubt.

Primula cephalantha, Balf. fil.

Pilosa rhizomate parvo. Folia rosulata petiolata ad 10 cm. longa ad 2 cm. lata; lamina anguste oblonga vel sublanceolata obtusa margine serrato-lobata vel inaequaliter grosse dentata supra pubescens subtus pallidior pilis villosis praesertim ad venas obtecta deorsum in petiolum lamina breviorem vel eam aequantem alatum villosum attenuata. Scapus ad 25 cm. altus glaber superne plus minusve luteo-farinosus capitulum pluriflorum subspicatum gerens; bracteae externae ad 7 mm. longae membranaceae plus minusve luteo-farinosae deflexae basi lata vaginantes minutissime ciliatae superne acuminatae calycem aequantes interiores minores; pedicelli subnulli; anthopodium latum flore abstrictum. Flos deflexus. Calyx tenuiter membranaceus pallide viridis cupuliformis dense luteo-farinosus ad 4 mm. longus haud ad medium fissus lobis mucronulatis inaequalibus posteriore maximo rotundato anteriore angustiore ovato vel oblongo obtuso vel subacuto. Corollae purpureae anguste tubulosae limbo concavo tubus ad 8 mm. longus extus luteo-farinosus intus glaber exannulatus infra stamina in flore brevistylo rugosus, limbi discus 2.5 mm. longus luteo-farinosus, lobi aperti breves 2.5 mm. longi erecti oblongi vel subquadrati vel subrectangulares nec rotundati apice vix integri nec emarginati. Stamina floris brevistyli ad faucem inserta antheris ex tubo prolatis, floris brevistyli ad basin tubi corollini, filamentis brevissimis. Ovarium globosum; stylus longus exsertus, brevis calyce brevior; stigma discoideum. Capsula globosa calyce paullo aucto densissime luteo-farinoso inclusa.

Species Sectionis Muscarioidis optime distincta. Ex affinitate *P. pinnatifidae*, Franch., foliis pilis dense vestitis, bracteis vaginantibus, lobis corollinis vix integris haud rotundatis differt.

Yunnan. High plateau of Je-mo-tchouan. Alt. 9600 ft. Flowers blue violet. July. E. E. Maire. In Herb. Edin.

Perhaps the nearest affinity of *P. cephalantha*, Balf. fil. is with *P. pinnatifida*, Franch. Broadly, the form of leaf is the same, but *P. cephalantha*, Balf. fil. is a much more hairy form and never has the bright green foliage that characterises *P. pinnatifida*, Franch. The inflorescence and flower of the two plants differ. In *P. cephalantha*, Balf. fil. the head is more spicate, the outer bracts have a broad sheathing base, the posterior calyx lobe is not denticulate and the others are rarely acute, the corolla lobes are not imbricate and have not the broad rotundate quite entire shape of those of *P. pinnatifida*, Franch. Lastly, as the fruit is formed the yellow meal that is developed forms a dense coating on the bracts and calyx—a feature not

seen in *P. pinnatifida*, Franch. To *P. Giraldiana*, Pax there is a superficial resemblance, but that plant has bright green leaves with few hairs and without the lobation seen in *P. cephalantha*, Balf. fil. and then the corolla lobes are differently shaped. *P. cernua*, Franch. which is also distinctly recalled has spathulate leaves.

1503 **Primula chionantha,** Balf. fil. et Forrest.

Robusta farinosa epilosa radicibus crassis foliorum rosula sub anthesi evoluta alabastri squamis plurimis ad 8 cm. longis rubris nitidis chartaceis cincta. Folia magna ad 25 cm. longa ad 5 cm. lata lanceolata vel oblanceolata vel oblongo-obovata vel oblongo-elliptica crassa acuta vel obtusa integra deorsum in petiolum alatum costa media prominula sensim attenuata supra nuda subtus plus minusve luteo-farinosa. Scapus robustus ad 40 cm. altus plus minusve luteo-farinosus umbellam plurifloram et verticillos inferos 2–3 gerens; bracteae a basi 3 mm. lata angustatae obtusae ad 1.5 cm. longae inferne extus purpurascentes superne nigro-virides et sparsim luteo-farinosae intus dense luteo-farinosae; pedicelli crassi luteo-farinosi reflexi sub anthesi bracteas vix superantes sub fructu purpurascentes et multo elongati; anthopodium magnum latum. Calyx ad 9 mm. longus vel minor globoso-campanulatus extus nigro-viridis vel purpurascens luteo-farinosus praesertim ad sinus segmentorum lobis ligulatis apice angustatis obtusis vel subtruncatis intus dense luteo-farinosis. Corollae tenuis membranaceae niveae tubus ad 1.2 cm. longus in flore brevistylo cylindricus supra stamina ampliatus in flore longistylo infundibuliformis extus intusque glaber nitidus annulo albo lobato instructus, limbi discus ad 2 mm. latus, lobi elliptici vel ovati vel rotundati integri ciliati ad 8 mm. longi. Stamina filamentis conspicuis antheris 2.5 mm. longis in flore longistylo infra medium tubi corollini inserta calyce inclusa, in flore brevistylo fere exserta. Ovarium hemisphaeroideum in dimidio superiori lobulatim incrassatum; stylus longus calyce duplo longior fere corolla exsertus, brevis calyce triente brevior; stigma globosum. Capsula pallida cylindrica calycem triente superans ab apice valvis 5 breviter dehiscens; placenta columnaris stipitata. Semina complanata testa plus minusve spongiosa.

Planta magnifica sectionis Nivalis ab microformis omnibus orientalibus *P. nivalis*, Pallas floribus albis verticillatim dispositis distinguenda.

Yunnan. Mountains of the Chungtien plateau. Lat. 27° 55′ N. Alt. 12,000–13,000 ft. Plant of 14–30 inches. Flowers pure snow-white, fragrant. On open alpine meadows. G. Forrest, No. 10,686. July 1913. In Herb. Edin.

This is indeed a noble plant, best described as a large white-flowered *P. nivalis*, Pallas in which several whorls of flowers are developed in addition to the terminal umbel.

1598 **Primula citrina,** Balf. fil. et Purdom.

Albo-farinosa foliis paucis petiolatis sub anthesi cataphyllis pallide brunneis membranaceis alabastri cinctis. Folia laete viridia ad 7 cm. longa; lamina late ovata vel elliptica vel orbicularis ad 3 cm. longa ad 2 cm. lata apice obtusa vel rotundata margine inaequaliter serrato-dentata basi abrupte in petiolum cuneatim contracta supra sparsim puberula subtus dense albo-farinosa; petiolus lamina duplo-longior anguste membranaceo-alatus basi vaginans. Scapus ad 5 cm. altus foliis brevior subtiliter puberulus umbellam 3–5-floram gerens; bracteae lanceolato-acuminatae ad 7 mm. longae uninerviae subtiliter puberulae basi subauriculatae leviter carinatae et incrassatae; pedicelli bracteis longiores ad 1.5 cm. longi tenues erecti stricti vix puberuli; anthopodium conspicuum. Calyx ad 6 cm. longus anguste campanulatus tubo 5-nervio puberulo ultra medium fissus lobis adpressis lineari-lanceolatis acutis membranaceis ciliolatis. Corollae citrinae tubus ad 1.4 cm. longus calyce longior exannulatus intus leviter rugosus, lobi obcordati 7 mm. longi profunde emarginati. Floris longistyli stamina ad medium tubi corollini inserta. Ovarium globosum; stylus longus filiformis tubum corollinum aequans; stigma parvum rubrum.

Species *P. flavae*, Maxim. affinis sed petiolo angusto, scapo foliis breviore, bracteis pedicellis multo brevioribus, calyce campanulato segmentis acutis diversa.

Western Kansu. Lien Wha Shan. 12,000 ft. Coll. Purdom. No. 739. In Herb. Kew.

This is a bright species which I have described from Purdom's dried specimens in Kew Herbarium. Messrs. Veitch have been so good as to present to the Royal Botanic Garden a living plant of a Primula raised from Purdom seeds said to be of this plant, but in its growth so far—it is not a plant of easy cultivation—it does not show the characters of Purdom's dried specimens, but rather impresses me as being the plant described by Maximowicz as *P. flava*, Maxim.* I have seen no example of Maximowicz's plant, and Purdom's dried specimens differ conspicuously from the description of *P. flava*, Maxim. in the petioles, which are long and narrow (not broad), in the scape shorter than the foliage (not "much longer"), in the campanulate puberulous calyx not tubular and mealy, in the bracts much (not slightly) shorter than the pedicels. It must be remembered, however, that *P. citrina*, Balf. fil. et Purdom is described from

* Maxim. in Bull. Acad. St. Petersb. xxvii (1881), 497.

a limited number of specimens from one collecting, and that *P. flava*, Maxim. also is described from one collecting by Przewalski on the Upper Hoangho in Kansu. Further knowledge may modify the view I have expressed.

A remarkable feature seen on Purdom's specimens is a coarse warting over the surface of the lamina. Mr. M. Y. Orr, Assistant in the Laboratory of the Royal Botanic Garden, has been so good as to examine these warts for me, and reports :—

" (*a*) The pustules are groups of enlarged and malformed cells of the upper epidermis of the leaf.

" (*b*) Each cell of a group is full of bacteria—a bacillus sp.—the original living contents of these cells having disappeared.

" These pustules appear to be ' bacterial galls,' but the condition of the specimen makes it almost impossible to say whether the bacillus is the cause of the malformation, or whether it is merely following in the wake of some other causative disease."

1038 **Primula compsantha,** Balf. fil. et Forrest.

Epilosa rhizomate brevi foliorum praeteritorum vestigiis vestito. Folia membranacea sub anthesi parva ad 5 cm. longa ad 1 cm. lata oblongo-spathulata obtusa crenato-dentata deorsum integra et in petiolum alatum alis membranaceis senism attenuata supra viridia subtus luteo-farinosa venis primariis e costa media prominula regulariter pinnatim orientibus. Scapus ad 9 cm. longus tenuis ad apicem sparse farinosus umbellam parvam 2–4-floram gerens ; bracteae paucae ad 6 mm. longae curvatim adscendentes sparsim farinosae a basi vaginata auriculata acuminatae sine hydathodo conspicuo terminali margine minutissime ciliatae ; pedicelli erecti bracteis plerumque longiores saepe aequilongi vel eis breviores sparsim farinosi ; anthopodium parvum. Calyx poculiformis in flore brevistylo 6 mm. in flore longistylo 8 mm. longus costis viridibus intervallis submembranaceis luteo-farinosis vittatus ultra medium fissus lobis ligulatis obtusis. Corollae tubus subinfundibuliformis floris brevistyli 1.2 cm. longistyli 1 cm. longus membranaceus pallide flavus intus sparsim ad orem dense puberulus exannulatus supra stamina paullo ampliatus infra stamina vix rugosus, limbi patuli discus 2 mm. latus, lobi rosei (Forrest) 8 mm. longi oblongi emarginati. Stamina fere sessilia floris brevistyli supra medium tubi corollini inserta antherarum apicibus circ. 2 mm. ab ore remotis, floris longistyli basin versus inserta antheris calyce multo brevioribus. Ovarium ovoideum ; stylus longus tubum corollae aequans, brevis calyce brevior ; stigma discoideum depressum sublobulatum.

Ex affinitate *P. minoris*, Balf. fil., calyce viridi, corolla exannulata facile distinguenda.

Yunnan. Open stony pasture. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 11,000 ft. Plant of 3–5 inches. Flowers rose with greenish-yellow eye. Fragrant. G. Forrest. No. 10,567. July 1913. In Herb. Edin.

A small Chinese species of which we do not know the fruit, and its position is therefore not yet certain. It recalls in many ways *P. minor*, Balf. fil. et Ward but the absence of the conspicuous annulus of that species is a strong diagnostic mark. Instead of an annulus the throat has a fairly dense assemblage of minute hairs at the eye which according to Mr. Forrest is greenish yellow. It is altogether a more delicate species than *P. minor*, Balf. fil. et Ward and has a flower that is large for the size of the plant, the corolla, Mr. Forrest says, being rose-coloured.

Primula conspersa, Balf. fil. et Purdom.

Herba foliis petiolatis rosulatis epilosis subtus farina alba conspersis. Folia ad 5 cm. longa ; lamina ad 3.5 cm. longa ad 1.5 cm. lata oblongo-lanceolata coriacea paginis concoloribus apice obtusa margine dentibus brevibus subapiculatis dispariliter sectilis basi in petiolum subalatum ad 1.5 cm. longum subcuneatim attenuata. Scapus pro planta elatus ad 2.5 dm. altus plus minusve albo-farinosus umbellam multifloram nunc verticillo inferiori gerens ; bracteae cum pedicellis albo-farinosae circa 7 mm. longae 1.5 mm. latae pedicellis multo breviores a basi lata subtus pulvinatim convexa vix gibbosa sursum attenuatae acutae subcarinatae ; pedicelli ad 1.5 longi stricti ; anthopodium turbinatum 0.5 mm. longum. Calyx extus intusque plus minusve farinosus 5 mm. longus subfusiformis 5-angulatus ultra medium fissus lobis sinu membranaceo elongato-triangularibus acutis ad tubum corollae applicitis brevissime ciliatis interdum purpurascentibus. Corollae pallide lilacinae aurantiaco-oculatae tubus luteus cylindricus 8.5 mm. longus 1.5 mm. latus extus sparsim albo-farinosus intus lobato-annulatus supra stamina aurantiaco-rugosus in flore brevistylo per trientem superiorem ampliatus, in longistylo non ampliatus, limbi plani discus 0.5 mm. diam., lobi subtus farina conspersi 9 mm. longi bifidi crenulati. Stamina in flore longistylo ad medium tubi corollini inserta filamentis circa 0.5 mm. longis vix basi dilatatis antherarum apicibus ab annulo circ. 2.8 mm. remotis, in brevistylo annulum juxta inserta apicibus subexsertis. Ovarium ovoideum; stylus longus exsertus, brevis ad 2 mm. longus calyce brevior ; stigma discoideum pallide flavo-viride. Capsula subcylindrica.

Ex affinitate *P. auriculatae*, Lam., foliis sparsim farinosis bracteis vix gibbosis calycis forma notata.

West Kansu. Chioni and Minchowe. Damp soils. 8000–9000 ft. Purdom. No. 687. In Herb. Kew.

This plant was discovered by Purdom when exploring for Veitch & Son and was introduced to cultivation by them in 1913.

Primula coryphaea, Balf. fil. et Ward.

Minutissima radicibus flavidis efarinosa epilosa alabastris foliaceis axillaribus plurimis instructa. Folia dense rosulata petiolata ad 6.5 mm. longa spathulata; lamina ad 2.5 mm. diam. elliptica vel suborbicularis basi cuneata inciso-lobata lobis acutis revolutis utrinque viridis; petiolus anguste alatus laminam aequans vel vix longior. Scapus validus puberulus 3 mm. longus foliis brevior uniflorus 2-bracteatus; bracteae alternae glabrae virides 5 mm. longae ligulatae acutae uninerviae inferior a flore 1 mm. superior calycem juxta inserta. Calyx 5.5 mm. longus tubulosus 5-costatus costis purpurascentibus intervallis pallidis purpureo-punctatis ad medium fissus lobis oblongis acutis obscure undulato-crenulatis penniveniis venis purpureis. Corollae cyaneo-violaceae tubus cylindricus 7 mm. longus calycem paullo superans extus glaber intus paullo rugosus ad faucem pilis albis longis dense pulvinatim aggregatis clausus, lobi obcuneati fere ad medium bilobulati. Stamina in flore longistylo ad basin tubi corollini supra ovarium inserta antheris parvis vix 1 mm. longis filamentis fere nullis. Ovarium ovoideum; stylus longus fragilis corollae tubo longior; stigma pyriforme inter pilos faucis prolatum.

Sectionis Bellae species efarinosa *P. indobellae*, Balf. fil. et W. W. Sm., et *P. Bonatianae*, Petitm. similis sed bractearum dispositione formaque, flore cyaneo-violaceo notisque aliis distincta.

Burma. On open summit of granite mountains, occupying patches of coarse sandy soil between the patches of dwarf Rhododendron; forms tufts or carpets. Alt. 13,000 ft. Flowers rich blue violet. Hairs of throat white. F. Kingdon Ward. No. 1805. 16th July 1914. In Herb. Edin.

A beautiful dwarf species of the efarinose series of the Section Bella. Two other efarinose species belong to the series—*P. Bonatiana*, Petitm. and *P. indobella*, Balf. fil. et W. W. Sm. From the former—a species only briefly described by Petitmengin—it differs by its much smaller size, its bracts, the form of calyx and its lobes, the form of the corolla lobes. From the latter by its bracts and its corolla tube without hairs outside.

The discovery of this species furnishes a link connecting the

true *P. bella*, Franch. of China with the Bhutan form *P. indobella*, Balf. fil. et W. W. Sm.

Primula fasciculata, Balf. fil. et Ward.

Pusilla epilosa rhizomate parvo vaginis siccis foliorum vetustorum obtecto foliis rosulatis longe petiolatis. Folia ad 2 cm. longa; lamina oblonga vel elliptica vel subovata obtusa vel apice rotundata margine integra cartilaginea ad 8 mm. longa ad 4 mm. lata crassiuscula subtus plus minusve sparsim farinosa; petiolus lamina 2–3-plo longior alatus longe vaginans. Flores plurimi axillares solitarii; pedicelli ad 5 cm. longi tenues; anthopodium conspicuum. Calyx tubulosus ad 4 mm. longus 5-costatus intervallis pallidioribus granulosus ad quadrantem fissus lobis deltoideis hydathodo corneo terminatis. Corollae pallide roseae flavo-oculatae tubus in flore brevistylo infra cylindricus supra stamina sursum ampliatus ad 6 mm. longus extus pallidus intus non rugosus annulo parvo ad orem instructus, lobi ex disco angustissimo limbi horizontaliter patentes 5 mm. longi obovati emarginati. Stamina in flore brevistylo ad orem tubi corollini inserta antheris 1.5 mm. longis semiexsertis filamentis brevibus. Ovarium globosum ad trientem supremum incrassatum 5-valvatim lobatum; stylus brevis albidus calycis tubum aequans validus; stigma parvum anguste capitatum.

Planta aspectu *P. tibeticae*, Watt sed floribus majoribus solitariis axillaribus differt.

Yunnan. Flowers deep rose-pink with orange eye. Covering bogs on the Chungtien plateau. 11,000–12,000 ft. May 1913. F. Kingdon Ward. No. 279. In Herb. Edin.

In dried specimens like the East Himalayan *P. tibetica*, Watt especially the form of that species in which the scape is very short and concealed within the leaves. Perhaps one ought to look at *P. fasciculata*, Balf. fil. et Ward as the West Chinese representative of the Himalayan *P. tibetica*, Watt. I find no trace of a scape in any specimen, and the flowers are always solitary in the axils of the leaves. The flowers in *P. fasciculata*, Balf. fil. et Ward do not show the characteristic reflexing of the petals of *P. tibetica*, Watt. The leaves of *P. tibetica*, Watt are said to have no meal, but I find it always—especially in young leaves.

Primula florida, Balf. fil. et Forrest.

Rhizoma parvum multiceps foliis petiolatis. Folia ad 8 cm. longa; lamina ad 3.5 cm. longa ad 3 cm. lata in forma et magnitudine varia oblonga elliptica ovata rotundata basi subtruncata vel subcordata venis primariis flabellatis in petiolum cuneatim attenuata obtusa vel apice rotundata margine

dentato-lobulata dentibus vel lobulis integris vel denticulatis hydathodo corneo terminatis supra pube quasi pulverulenta infra albo-farinosa vel pilis minutissimis capitatis glandulosis obtecta. Scapus gracilis ad 20 cm. altus minute puberulus superne albo-farinosus umbellam ad 9-floram gerens; bracteae ad 8 mm. longae 2 mm. latae pedicellis aequilongae vel eis longiores a basi lata ligulato-lanceolatae acutae crassiusculae albo-farinosae circum pedicellos cucullatae et plus minusve basi adhaerentes carinatae; pedicelli farinosi validi; anthopodium conspicuum. Calyx circa 6 mm. longus extus intusque albo-farinosus (regione interiore tubi circa ovarium excepto) 5-costatus ad medium fissus lobis a basi lanceolatis acutis. Corollae cyaneo-purpureae tubus cylindricus sursum ampliatus ad 12 mm. longus exannulatus glaber membranaceus intus infra stamina transverse rugosus, limbi discus concavus 5 mm. longus, lobi ad 7 mm. longi obovati vel subobcuneati imbricati emarginati subcrenulati. Stamina filamentis conspicuis in flore longistylo circ. 2 mm. a basi tubi corollini inserta antheris calyce inclusis in flore brevistylo e fauce paullo exserta. Ovarium ovoideum; stylus brevis 2 mm. longus segmentis calycis dimidio brevior, longus tubum corollae fere aequans tenuis; stigma discoideum depressum revolutum. Capsula cylindrica melichlora ad 5 mm. longa calyce inclusa tubo longior segmentis brevior superne incrassata valvis 5 ab apice dehiscens; placenta stipitata columnaris. Semina minuta oblonga 0.5 mm. longa; testa cellulis aeriferis subbullata.

Ex affinitate *P. Souliei*, Franch. sed farinosa omnino major et foliis lobulatis, scapo longiore, pedicellis brevioribus distinguenda.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Open situations in stony pastures at the base of limestone cliffs. Alt. 12,000 ft. Plant of 6–14 inches. Flowers blue, fragrant. G. Forrest. No. 10,484. July 1913. In Herb. Edin.

Yunnan. Alt. 12,000–13,000 ft. Plant of 9–18 inches. Flowers purplish blue, tinged rose. Differing from 10,484 in being occasionally farinose, in stature, colour of blooms, etc. G. Forrest. No. 10,486. July 1913. In Herb. Edin.

Yunnan. Mountains of the Chungtien plateau. Alt. 12,000 ft. Lat. 27° 55′ N. Stony alpine pasture. Plant of 6–12 inches. Flowers deep purplish blue, tube suffused rose. G. Forrest. No. 10,774. Aug. 1913. In Herb. Edin.

Yunnan. G. Forrest. No. 11,198. Sept. 1913. In fruit. In Herb. Edin.

A beautiful species which seems to find its nearest relationship in *P. Souliei*, Franch. and *P. Legendrei*, Bonati. A larger plant than either of these species, its possession of

white meal is a ready mark of separation. The meal is not always present on the leaves, but invariably is upon the bracts, pedicels, and calyx. In fruit the calyx is densely farinose, both outside and in, excepting on the inside of the cup. I have not seen the fruit of *P. Souliei*, Franch., which is described by Franchet as ovate, by Pax as ovoid. In *P. florida*, Balf. fil. et Forrest, it is cylindric but short, exceeding by but little the calyx tube, and shorter than the lobes. The seeds are extremely small.

1022 **Primula fragilis,** Balf. fil. et Ward.

Pusilla stolonifera luteo-farinosa epilosa rhizomate tenui foliis desiccatis vetustis obtecto radicibus filiformibus. Folia membranacea ad 1.4 cm. longa 6 mm. lata spathulata obtusa superne dentata deorsum integra cuneatim in petiolum laminam aequantem anguste alatum evaginantem attenuata utrinque luteo-farinosa. Scapus filiformis ad 2.5 cm. altus plus minusve luteo-farinosus uniflorus; bracteae duae herbaceae luteo-farinosae subulatae alternae inaequales superior major 2 mm. longa pedicellum aequans; pedicellus erectus luteo-farinosus bracteae superiori aequilongus. Calyx luteo-farinosus minutus aperte campanulatus 2.5 mm. longus ad vel ultra medium fissus lobis elongato-triangularibus acutis. Corollae violaceae tenuis tubus 6 mm. longus cylindricus supra stamina in flore longistylo expansus erugosus exannulatus, limbi discus 1 mm. latus, lobi 3 mm. longi obcuneati divaricatim bifidi. Stamina filamentis brevissimis antheris 1.5 mm. longis in flore brevistylo fere exserta, in longistylo calyci aequilonga. Ovarium sphaeroideum; stylus brevis calyce brevior, longus tubum corollae aequans; stigma capitatum.

Species sectionis Yunnanensis forma pusilla distincta.

Upper Burma near Feng-shin-ling pass. Alt. 9000–10,000 ft. On limestone cliffs where it forms moss-like patches in half-shade. Flowers pale purple. F. Kingdon Ward. No. 1644. 7th June 1914. In Herb. Edin.

A minute stoloniferous plant which by its characters fully confirms the description given by Ward of its habitat. It has the assemblage of persistent dried brown leaves coating the thin stolonoid rhizomes which are so conspicuous in plants like *P membranifolia*, Franch. and *P. yunnanensis*, Franch.

Primula Gageana, Balf. fil. et W. W. Sm.

Paludicola efarinosa epilosa (corolla excepta). Folia breviter petiolata ad 7 cm. longa 2 cm. lata; lamina oblonga vel anguste elliptica vel subobovata obtusa margine cartilaginea remote leviter denticulata utrinque concolor subtus

glanduloso-foveolata deorsum in petiolum brevem late alatum attenuata. Scapus ad 10 cm. altus flores 1–8 umbellatim gerens; bracteae lineari-subulatae inaequales ad 6 mm. longae pedicellis breviores; pedicelli inaequales ad 1.5 cm. longi erecti; anthopodium conspicuum parvum. Flos ab apice pedicelli deflexus. Calyx campanulatus ad 5 mm. longus submembranaceus rubro-punctatus ad trientem fissus lobis late triangularibus vel subovatis minutissime fimbriatis nervo singulo nigro-rubro percursis hydathodo conspicuo nigrescente terminatis. Corollae purpureae subcrassiusculae tubus brevis in flore brevistylo cylindricus circa 5 mm. longus intus rugosus exannulatus (?) in flore longistylo infra stamina cylindricus sursum ampliatus laevis et annulo obscuro praeditus in ambobus extus parte calyce inclusa glabra excepta velutino-puberulus, limbi concavi campanulati discus extus intusque velutino-puberulus, lobi ad 4 mm. longi subrectangulares vel subcuneati apice subtruncati vel subconvexi erosi vel denticulati vel crenulati venulis undulatis vix anastomosantibus percursi. Staminum filamenta conspicua in flore brevistylo 2 mm. longa antheraeque 1 mm. longae ad apicem tubi corollini inserta apicibus exsertis, in flore longistylo filamenta 1 mm. longa antheraeque 1.5 mm. longae a basi tubi corollini circ. 2.5 mm. inserta apicibus circ. 2 mm. ab annulo remotis. Ovarium globosum; stylus longus exsertus calyce duplo longior, brevis validus calycem vix aequans; stigma discoideum.

Species pulchra ex affinitate *P. Kingii*, Watt sed minor et foliis oblongis obtusis, calyce submembranaceo lobis uninerviis, corollae loborum venatione distincta.

Sikkim. Joloong. Alt. 13,000 ft. Very high, near snow. July 1886. Purple. King's Collector. In Herb. Calc.

We know this plant in one set of specimens only in the Calcutta Herbarium. The collector describes the flowers as "purple," but their aspect in the dried specimens suggests more red than purple and a tint approaching somewhat that of the flowers of its ally *P. Kingii*, Watt. From *P. Kingii*, Watt it is readily distinguished by its foliage. The leaves in addition to their oblong obtuse outline never show the pale tint when dry to which Sir Joseph Hooker calls attention in *P. Kingii*, Watt, and then the calyx is very different. The ribbing due to the prominent dark veins in the calyx of *P. Kingii*, Watt is absent, and instead there is a single dark vein running out into each calyx segment. The corolla shows, but in less degree, the velvety puberulousness so characteristic of *P. Kingii*, Watt but the venation is curiously diverse in the two plants. The veins in the corolla lobes of *P. Kingii*, Watt

are straight and anastomose in characteristic fashion. Here in *P. Gageana* the veins are all undulate and run out through the lobes with hardly an anastomosis. The species is one well worthy of being searched for. It should be a pretty species for cultivation. The roots indicate that the plant grows in a habitat where there is an abundance of soil moisture.

Primula glandulifera, Balf. fil. et W. W. Sm.

Pusilla caespitosa corolla excepta glanduloso-puberula. Folia petiolata ad 2 cm. longa; lamina ad 7 mm. lata petiolo brevior elliptica vel oblongo-elliptica vel subobcuneata apice rotundata circumcirca obtuse serrato-dentata deorsum in petiolum alatum gradatim attenuata. Scapus validus ad 5 mm. longus flores 2–4 sessiles pro planta magnos gerens; bracteae ligulatae sursum attenuatae 4–5 mm. longae obtusae vel obtusiusculae ad basin latam paullo inflatae vix gibbosae; pedicellus nullus. Calyx 5–6 mm. longus poculiformis rufo-punctatus fere ad basin fissus segmentis lanceolatis obtusis ciliatis. Corollae tubus 1 cm. longus exannulatus intus rugosus fauce et limbi basi granulosus, lobi 5 mm. longi 4 mm. lati obovati profunde emarginati membranacei. Stamina in flore brevistylo supra medium tubi corollini inserta. Stylus brevis 1 mm. longus calyce multo brevior; stigma globosum.

Ex affinitate specierum Sectionis Minutissimae foliis glanduliferis, scapo breve, bracteis subcalycinis, floribus sessilibus, distincta.

Kumaon. Above Napatcha in Kuth Valley. Alt. 13,000 ft. Duthie. No. 3137. 13th Sept. 1884. In Herb. Calc.

Kumaon. Above Dudhpani. About 13,000 ft. J. E. Reid. 27th July 1886. In Herb. Edin.

This species is known in a few specimens in the Edinburgh Herbarium of a Primula collected, 27th July 1886, by Mr. J. E. Reid, C.I.E., above Dudhpani, at an altitude of 13,000 ft., and marked by him as probably a new species. Sir George Watt writes on the sheet bearing Mr. Reid's specimen: "This is the plant collected by Duthie above Napatcha, 13,000 ft., in Kumaon 13.9.84, and named *P.* near *P. elliptica*, Royle. It is a perfectly good and new species belonging to the Section Denticulata, and is near *P. Heydei*, Watt. Until carefully examined it might be mistaken for *P. Stirtoniana*, Watt, and *P. minutissima*, Jacquem. var. *spathulata*, Hook. f. [*P. spathulifolia*, Craib]. It is also near *P. tenella*, King, a much misunderstood species from the position of the bract being disregarded."

Duthie's specimen in Calcutta Herbarium, the only other known, confirms Sir George Watt's identification, and also both his and Mr. Reid's comment that the plant is a new species.

The species is very distinct in the series of dwarf tufted Primulas with exannulate corollas. The glandular covering is that of *P. Walshii*, Craib, but the form of leaf of that species and its involucrally disposed bracts, as well as the flower characters, at once distinguish it. *P. spathulifolia*, Craib and *P. melichlora*, Balf. fil. et W. W. Sm. have leaves of form like those of our species, but neither of them is glandular and their inflorescence is not capitular. *P. Stirtoniana*, Watt is also very different both in form of foliage and in inflorescence. *P. minutissima*, Jacquem. is altogether a smaller plant with involucral bracts, smaller flowers, and different flower details, and it is not glandular. *P. Heydei*, Watt is at once diagnosed by its long scape, and there are many other differences.

Primula Harrissii, Watt ex scheda in Herb. Edin.

Epilosa foliis floribusque coaetaneis sed sub anthesi nondum desquamatis. Folia crassa ad 5 cm. longa ad 1 cm. lata spathulata obtusa margine subcartilaginea plus minusve acute dentata utrinque glanduloso-foveolata deorsum in petiolum alatum vaginantem lamina breviorem attenuata. Scapus ad 6 cm. longus robustus glaber umbellam circ. 6-floram gerens; bracteae latae ad 4 mm. longae subvaginantes acuminatae carinatae et basi subtus in saccum brevem rotundatum 0.5 mm. diam. expansae; pedicelli rigidi erecti ad 7 mm. longi in anthopodium longum sursum gradatim expansi. Calyx ad 5 mm. longus campanulatus obscure 5-costatus glaber ad medium fissus lobis longe lanceolatis obtusis. Corollae tubus 8 mm. longus cylindricus in flore brevistylo supra stamina ampliatus intus fauce farinosus supra stamina plus minusve transverse rugosus rugis supremis ad orem annulatim projectis, limbi discus farinosus 1 mm. latus, lobi obcordati vel obovati 5 mm. longi integri profunde emarginati. Stamina filamentis brevibus antherisque 1.5 mm. longis, in flore longistylo a basi tubi corollini 2 mm. ovarium juxta inserta calyce inclusa, in flore brevistylo ad medium tubi corollini ultra calycem inserta antherarum apicibus ab ore 2 mm. remotis. Ovarium oblongum in triente supremo stylopodio valvatim incrassatum; stylus longus ultra medium tubi corollini elongatus, brevis tubum calycis aequans; stigma magnum ovoideum.

P. roseae, Royle peraffinis sed minor et foliis floribusque coaetaneis distincta.

Chitral. Guger. 8500–11,000 ft. Coll. Harriss. No. 16,333. 19th May 1895. In Herb. Calc., Edin. et Kew.

Afghanistan. Griffith. No. 3512. In Herb. Calc. et Kew.

Afghanistan. Griffith. No. 1058, Journal. In Herb. Kew.

Sir George Watt recognised this plant as a species distinct

from *P. rosea*, Royle and names it *P. Harrissii*, Watt in his herbarium now at Edinburgh. In his account of Indian Primulas to the Royal Horticultural Society * he refers to it by name as an undescribed species, and nowhere has it been described. I have therefore described it above and add that it is one of the microforms of the aggregate *P. rosea*, Royle, distinguished from the type plant by its less stature and the smaller mould of all its parts. Also it is apparently not precocious, as *P. rosea*, Royle is.

P. rosea, Royle exhibits several distinct microforms in its wide distribution over the N.W. Himalaya. It was first described and figured by Royle † in 1839 in specimens collected at Kedarkante. Five years later Duby ‡ included the species in his monograph and described under the name *P. elegans*, Duby, a plant—No. 508 of Jacquemont's in the Paris Herbarium—which he recognised as being near *P. rosea*, Royle—" An revera distincta ? " Sir Joseph Hooker § cites *P. elegans*, Duby, as a variety of *P. rosea*, Royle distinguishing it by its " corolla smaller, tube longer, lobes narrower." Pax ‖ merges *P. elegans*, Duby in *P. rosea*, Royle. A curious history attaches to these two forms, *P. rosea*, Royle and *P. elegans*, Duby. In 1879 Sir Joseph Hooker figured in the Botanical Magazine (1879), tab. 6437 under the name *P. rosea*, Royle a plant which had just been introduced to cultivation raised from seeds collected by Dr. Aitchison, " which were widely distributed, and from which, I believe, all the plants hitherto cultivated have been grown. We received the first flowering specimen from Mr. Ware of Tottenham ; a few days afterwards it flowered at Kew and in many other collections. It is quite an alpine species. Thomson gathered it at 10,000 ft., and Griffith found it in Afghanistan in snow ravines at 11,000 ft. Dr. Aitchison has sent dried specimens of what is either a larger form or distinct species from a much lower level, 500 ft. at Gulmarz in Kashmir, and these have much larger obovate oblong and sharply toothed leaves with rounded apices." In Kew Herbarium is a sheet of Aitchison's Gulmarz specimens—Aitchison, No. 7. On the sheet is the following note by Aitchison: "See Bot. Mag. tab. 6437. The seeds for raising which were collected from the same locality at Gulmarz." This tells us that the plant figured in the Botanical Magazine, tab. 6437, is really the larger form which Sir Joseph Hooker suggested might be a distinct species and not the true *P. rosea*, Royle.

* Watt, Observations on Indian Primulas in Journ. R.H.S. xxix (1904), 299.
† Royle, Illustr. (1839), 311, t. 75, fig. 1.
‡ Duby, in DC. Prod. viii (1844), 41.
§ Hook. f. in Fl. Brit. In. iii (1882), 488.
‖ Pax, Primulaceae in Engler's Pflanzenr. (1905), 81.

In addition to Aitchison's specimens from Gulmarz there are in Kew Herbarium specimens from the same locality and from Sumbliali collected on 16th July 1892 by Duthie. An examination of them as well as of Aitchison's specimens and comparison with a somewhat fragmentary example of Jacquemont's type in Kew Herbarium received from Paris leads me to the conclusion that the Gulmarz and Sumbliali plants are *P. elegans*, Duby which is distinct from *P. rosea*, Royle, and the Botanical Magazine figure is therefore a representative of *P. elegans*, Duby. The plants in cultivation which all came from Aitchison's seed would therefore be *P. elegans*, Duby. Seeds under the name *P. rosea*, Royle have doubtless come to this country frequently since 1879, and the true *P. rosea*, Royle has been and is probably in cultivation alongside of *P. elegans*, Duby. It is likely enough that hybrids between them have been raised. This may in part account for the differences that appear in cultivated *P. rosea*, Royle. I have not given special attention to the cultivated form—and the standpoint is new ; but it is of common observation that some plants are precocious, others coetaneous, some have smaller narrower leaves, others larger broader ones, and then there are the named forms *grandiflora*, *splendens*, and probably others. I recollect that the late Mr. Selfe Leonard at one time had several more or less marked forms in his collection at the Guildford Nurseries. All this points to the need for more study of *P. rosea*, Royle in our gardens.

P. rhodantha, Balf. fil. et W. W. Sm. collected by Aitchison in the Kurrum Valley under No. 462, and by Harsukh under No. 14,931, is another dwarf form of the *P. rosea*, Royle aggregate with petiolate leaves and a short scape included in the foliage. See p. 39.

P. rosiflora, Balf. fil. et W. W. Sm. found by Harriss (Nos. 16,334, 16,335), and also by Gilg in Chitral, is a more dwarf microform in which there is almost no scape, the pedicels are long, and the corolla tube shows a prominently lobed annulus. See p. 41.

P. radicata, Balf. fil. et W. W. Sm.* gathered by Younghusband in Chitral during 1894, is another dwarf alpine of this series in which the solitary flowers are also embedded in the leaves which are very thick and coriaceous.

Primula helvenacea, Balf. fil. et Ward.

Luteo-farinosa epilosa foliis longe petiolatis. Folia ad 10 cm. longa ; lamina elliptica vel obovato-oblonga ad 2.5 cm. longa 1.5 cm. lata apice obtusa vel rotundata margine lobulato-dentata dentibus subobtusis supra opaca sparsim farinosa subtus

* This species will be described in a later page in these "Notes."

dense luteo-farinosa deorsum in petiolum longum ad 8 cm. longum gradatim attenuata ; petiolus anguste alatus in vaginam longam purpuream expansus. Scapus ad 20 cm. altus robustus plus minusve luteo-farinosus umbellam ad 8-floram gerens ; bracteae ad 1.2 cm. longae lineari-subulatae erectae minute ciliatae extus virides sparse farinosae intus dense luteo-farinosae basi subtus paullo incrassatae ; pedicelli inaequales longiores ad 3 cm. breviores 1 cm. longi validi dense luteo-farinosi ; anthopodium parvum. Calyx crassiusculus ad 8 mm. longus tubo brevissimo 1 cm. longo extus nigro-viridi sinubus intersepalinis luteo-farinosis intus glabro lobis ligulatis acutis adpressis intus dense luteo-farinosis. Corollae purpureae tenuissimae membranaceae in flore longistylo tubus cylindricus 1.2 cm. longus extus intusque glaber efarinosus erugosus annulo magno lobato instructus, limbi discus minutus, lobi magni patentes 1 cm. longi obovati retusi crenulati. Stamina filamentis brevibus et antheris latis 2 mm. longis basin tubi corollini versus inserta antherarum apicibus vix ad medium calycis attingentibus. Ovarium hemisphaeroideum superne incrassatum ; stylus longus validus tubo corollino triente brevior ; stigma breviter ovoideum.

Species *P. callianthae*, Franch. affinis sed foliis longe petiolatis, bracteis longioribus differt.

N.W. Yunnan. Mekong-Salween divide near A-tun-tsu. Precipices, 15,000 ft. F. Kingdon Ward. No. 827. 20th July 1913. In Herb. Edin.

This striking new species has, without doubt, affinity with *P. calliantha*, Franch. but its long stalked leaves with small lamina distinguish it at a glance.

Primula indobella, Balf. fil. et W. W. Sm.

Perpusilla dense caespitosa radicibus basi erubescentibus efarinosa stolonifera stolonibus brevibus. Folia glabra crassiuscula petiolata rosulata ad 8 mm. longa subspathulata ; lamina regulariter crenato-lobata lobis recurvatis hydathodo terminatis ; petiolus lamina longior ligulatus alis membranaceis integris. Scapus glaber ad 1 cm. longus folia subaequans vel eis longior uniflorus ; bractea singula minuta membranacea subulata subcalycina et calyci adpressa ; pedicellus nullus. Calyx poculiformis ad 4 mm. longus corollae tubo brevior viridis glaber ad medium fissus lobis latis oblongis obtusis nunc subtruncatis denticulatis. Corollae crassiusculae in flore brevistylo tubus 6 mm. longus infundibuliformis extus pubescens intus fauce dense albo-barbatus caeteroquin glaber, limbi discus concavus, lobi ad 5 mm. longi obcuneati profunde bifidi segmentis divaricatis. Stamina ad faucem inserta, antheris 1.5 mm. longis. Ovarium globosum ; stylus vix calycis tubum aequans ; stigma capitatum.

Species efarinosa Sectionis Bellae bractea singula subulata, corollae tubo extus pubescente, floribus cyaneis facile distinguenda.

Bhutan. Dang-dong. J. C. White. 10th July 1906. In Herb. Calc.

An interesting Western extension of the type of *P. bella*, Franch. which hitherto is known only from Yunnan.

1430 **Primula leimonophila,** Balf. fil.

Glabra efarinosa rhizomate brevi. Folia subcoriacea ad 6.5 cm. longa; lamina 1.4 cm. lata lanceolata acuminata a medio deorsum in petiolum dimidio breviorem membranaceo-alatum gradatim attenuata margine linea alba cartilaginea et in dimidio superiore dentibus firmis remotis recurvis notata. Scapus ad 2 dm. altus umbellam 4-6-floram unilateraliter subnutantem gerens sub umbella atropurpureus ibique plus minusve rugosus et glanduloso-puberulus; bracteae uninerviae atropurpureae exteriores ad 8 mm. interiores saepe 4 mm. longae basi expansae auriculatae et dorsaliter tumidae vel subinflatae neque calcaratae sursum anguste acuminatae; pedicelli distincti atropurpurei subscabridi vel asperuli bracteis exterioribus vix breviores interioribus duplo longiores; anthopodium ad 1.5 mm. longum. Calyx 5 mm. longus cylindricus corollae tubum aequans 5-costatus intervallis pergamentaceis atropurpureus punctatus scabriusculus ad medium fissus lobis a basi lanceolatis acutis uninerviis mucronulatis. Corollae cyaneae tubus ad 5 mm. longus in flore brevistylo crassiusculus intus rugosus in flore longistylo tenuis intus puberulus haud rugosus annulo 5-lobato lobis magnis inflatis infra orem instructus, in ambobus limbi concavi discus ampliatus circa 5 mm. latus plus minusve minute puberulus, lobi circa 5 mm. longi oblongi lateribus parallelis fere ligulati subtruncati late emarginati. Stamina antheris ad 1.5 mm. longis in flore brevistylo filamentis conspicuis fere 1 mm. longis deorsum expansis ad orem tubi corollini sine lobulis distinctis interstaminalibus inserta antherisque in cupulam disci corollini longe projectis, in flore longistylo filamentis brevibus vix 5 mm. longis deorsum expansis et lobis purpureis intersepalinis annulatim conjunctis prope basin tubi corollini inserta antherisque calyce brevioribus. Ovarium globosum parvum; stylus brevis calycis tubum aequans, longus circa 6 mm. longus limbi disco aequilongus; stigma globosum.

Species ad *P. argutidentem*, Franch. et *P. amethystinam*, Franch. spectans sed foliis lanceolatis acuminatis non ovatis vel ovato-oblongis distinguenda.

Hunan. Pastures of Yo-Chow. Alt. 9900 ft. June. E. E. Maire. Flowers Prussian blue. In Herb. Edin.

This beautiful species belongs to a series of which materials for a complete analysis are still wanting, especially living plants. No one of the series is definitely in cultivation though some may soon be so. Its immediate Chinese allies are *P. argutidens*, Franch., *P. amethystina*, Franch., *P. brevifolia*, Forrest, and *P. silaensis*, Franch. *P. petrophyes*, Balf. fil. may be an alpine microform of it. Then there are the Indian *P. Kingii*, Watt and *P. Gageana*, Balf. fil. All these are purple-blue or claret flowered species. *P. Faberi*, Oliv. is the only yellow-flowered species of the series as yet known, and it is Chinese.

P. amethystina, Pax * is a chimera and includes *P. argutidens*, Franch. and *P. amethystina*, Franch. The two species are distinct as Petitmengin † has shown.

A conspicuous feature in all the forms of the series is the cartilaginous margin of the glabrous somewhat glaucous leaf with sharp recurved teeth in the upper half. The umbel of more or less stalked flowers is secund. The nodding flowers and ampliate corolla limb recall the Soldanelloid Section, but in the foundation form of that section, and in the forms which without question are co-phyletic, the leaves are pinnatisectly dentate, have no horny margin, and are more or less pubescent.

Primula lhasaensis, Balf. fil. et W. W. Sm.

Farinosa epilosa rhizomate brevi crasso. Folia rosulata ad 7 cm. longa ad 2 cm. lata oblongo-spathulata acuta margine subcartilaginea inaequaliter denticulata dentibus hydathodo terminatis crassa supra punctata subtus plus minusve farinosa deorsum gradatim attenuata et integra petiolum brevem alatum vaginantem formantia. Scapus validus strictus ad 16 cm. longus superne plus minusve farinosus umbellam 4–8-floram gerens; bracteae lineari-subulatae ad 1.2 cm. longae basi subincrassatae pedicellis breviores; pedicelli ad 2.5 cm. longi sparsim farinosi stricti erecti tenues; anthopodium conspicuum disciforme. Calyx ad 1 cm. longus tubulosus 5-costatus intervallis pergamentaceis ultra medium fissus lobis a basi lanceolato-acuminatis hydathodo terminatis intus albo-farinosis. Corollae forsan violaceae tubus in flore brevistylo 1.6 cm. longus infra stamina anguste cylindricus supra stamina expansus extus efarinosus intus tenuiter rugosus fauce puberulus annuloque parvo instructus, limbi discus 1 mm. latus puberulus, lobi 5 mm. longi vel longiores obcuneati profunde bifidi. Stamina filamentis conspicuis antheris 2 mm. longis in flore brevistylo orem tubi corollini versus inserta antherarum apicibus 0.75 mm. ab annulo remotis in flore longistylo ad medium tubi corollini et supra

* Pax, Monogr. Primul. in Engler's Pflanzenr. (1905), 118.
† Petitmengin in Bull. Soc. Sci. Nancy, sér. 3, viii (1907), 8.

calycem inserta. Ovarium ovoideum in triente superno lobulatim incrassatum; stylus longus tenuis corollini tubum aequans, brevis calycem vix aequans; stigma capitatum lobulatum.

Planta forsan *P. Jaffreyanae*, King microforma sed robustior et foliis bracteisque longioribus, calyce tubuloso longiore, corollae tubo longiore, annulo minore notata.

Tibet. Hills above Lhasa. Walton. August 1904. In Herb. Calc.

This seems to be a Northern representative of the Chumbi *P. Jaffreyana*, King.

The Lhasa plant at first sight seems very different from *P. Jaffreyana*, King, having longer leaves, much more markedly toothed and less distinctly petioled, stouter and larger scapes, longer bracts and pedicels, and the flower with a larger and tubular calyx with long acuminate segments, the corolla tube is also longer, the annulus less distinctly marked, and the insertion of the stamens not the same. At the same time the Lhasa plant may be only a microform of *P. Jaffreyana*, King. Both species have a similar leaf construction of a distinct kind. The leaves are somewhat thick, and the upper side has a glistening look in dried specimens, due to the presence of many foveolae of a minute kind at base of each of which is a glandular hair. In dried specimens there are over the surface a number of brown tannin spots.

A series of specimens in the Calcutta Herbarium collected also by Capt. Walton, about Khamba in July 1904, at alt. 16,000 ft., resemble *P. lhasaensis*, Balf. fil. et W. W. Sm. more closely than *P. Jaffreyana*, King, yet in some ways seem to be near the latter species. It may be a form connecting the extremes of an aggregate as we know it.

I may note here that Sir George King* refers to *P. Jaffreyana*, King as approching *P. tibetica*, Watt but differing in its "much larger more membranous leaves." To my eye the plant is really not in the alliance of *P. tibetica*, Watt which belongs to the series including *P. sibirica*, Jacq., *P. involucrata*, Wall., *P. Wardii*, Balf. fil., while *P. Jaffreyana*, King has none of the conspicuous bract characters that distinguish them. Its place seems to me to be rather along with such forms as *P. florida*, Balf. fil., *P. hazarica*, Duthie, *P. Legendrei*, Bonati, *P. Souliei*, Franch. and other forms which constitute a characteristic enough section more or less farinose with leaves more or less stalked without cartilaginous margins, bracts linear subulate pulvinately thickened below at the base, ribbed calyces with parchment intervals, long corolla tubes, and delicate annulus. But at the moment I am not able to fix the limits of sections including such forms.

* King in Journ. Asiat. Soc. Bengal, lvii, 2 (1888), ii, 228, t. x.

Primula meiantha, Balf. fil. et W. W. Sm.

Monocarpica annua foliis rosulatis petiolatis. Folia ad 3.5 cm. longa ; lamina oblonga ad 2 cm. longa ad 1 cm. lata vel multo minor obtusa sinuato-lobata lobis acutis utrinque pilis longis articulatis hispida basi lateribus rotundatis vel subtruncatis in petiolum breviter cuneatim contractis ; petiolus laminam aequans vel ea brevior vix alatus. Scapi plures ad 10 cm. alti stricti tenues basi hirsuti superne plus minusve albo-farinosi umbellam plurifloram (ad 15-) unam nunc verticillo accessorio inferiori gerentes ; bracteae ad 4 mm. longae virides angustae ligulatae acutae puberulae ; pedicelli ad 1.5 cm. longi filiformes stricti inaequales puberuli. Calyx ad 2.5 mm. longus anguste campanulatus membranaceus puberulus plus minusve albo-farinosus vix ad medium fissus lobis inaequalibus lanceolatis vel oblongis triangulari-deltoideis acutis vel obtusis integris vel dentatis. Corollae violaceae tubus 4 mm. longus cylindricus extus flavidus glaber intus fauce lineis strumosis annulatim obscure instructus, lobi 2 mm. longi obcuneati apice eroso-crenulati. Stamina filamentis brevissimis in flore longistylo infra medium tubi corollini in flore brevistylo supra medium antherarum apicibus 1 mm. ab ore inserta. Ovarium ovoideum ; stylus longus non exsertus, brevis tubum calycis aequans ; stigma capitatum lobulatum. Capsula globosa calyce inclusa ab apice valvis 5 crustaceis dehiscens. Semina parva 0.5 mm. diam. nigro-brunnea angulata rhomboidea obscure scrobiculata.

Microforma *P. Forbesii*, Franch. floribus minutis distincta.

Burma. Shan Hills. General Sir Henry Collett, K.C.B., No. 1. 1887. In Herb. Calc.

Shan States. Mones. Alt. 3500 ft. January 1888. Coll. Manders. In Herb. Kew.

Shan Hills. Hepo. 3000 ft. 8th February 1888. Collett, No. 1. In Herb. Kew.

Upper Burma. Maymyo. Nadal Khan. No. 335. January 1889. In Herb. Calc.

Upper Burma. Southern Shan State Saga. Abdul Khalil. 1894. Flowers pink. In Herb. Calc.

Upper Burma. Shan Hills. E. Candler. 1897. In Herb. Calc. et Kew.

Upper Burma. Maymyo plateau. Alt. 3500 ft. Lace. No. 3143. 17th April 1908. In Herb. Edin., Calc. et Kew.

Upper Burma. Southern Shan States. Phillimore. No. 26. In Herb. Edin., Calc. et Kew.

This is the Burmese form of the Chinese Malacoides series. Its small flowers are a distinguishing feature. The leaves vary greatly in size from less than a centimeter upwards to the

maximum. The calyx is noteworthy on account of the irregular size of the lobes and their tendency to become toothed towards the apex.

Primula melichlora, Balf. fil. et W. W. Sm.

Caespitosa luteo-farinosa rhizomate lignoso. Folia ad 3·5 cm. longa ad 1 cm. lata; lamina oblonga vel anguste elliptica acuta margine argute et regulariter denticulata denticulis acutis deorsum in petiolum late alatum attenuata subtus dense luteo-farinosa supra sparsim farinosa subglauca venulosa. Flos solitarius; pedunculus 1 cm. longus farinosus bracteam singulam infra medium gerens; bractea ligulata membranacea uninervia farinosa ad 1.3 cm. longa pedicello longior. Calyx 6–7 mm. longus extus intusque farinosus ultra medium fissus lobis oblongis apice rotundatis vel subtruncatis mucronulatis vel obscure 3-denticulatis rarissime plus minusve acutis. Corollae crassae tubus 9 mm. longus extus glaber intus exannulatus fauce et limbi basi granulosus, lobi 4–5 mm. longi emarginati. Stamina floris longistyli basin tubi corollini versus brevistyli circa medium inserta. Stylus longus corolla dimidio brevior, brevis vix calycis tubo longior; stigma pyriforme. Capsula infra membranacea supra crustacea calyce lobis adpressis inclusa, a basi styli valvatim dehiscens.

P. spathulifolia, Craib foliis ellipticis, pedunculo farinoso longiore, bractea singula, calyce majore, corollae limbo minore differt.

Sikkim. Tosa. Alt. 14,000–15,000 ft. W. W. Smith. No. 4071. 3rd August 1910. In Herb. Calc.

This plant is known only in a set of specimens collected under No. 4071 by Mr. W. W. Smith in August 1910 at Tosa in Sikkim at an altitude of 14,000–15,000 ft. It is in the way of *P. spathulifolia,* Craib but has characters which point to its distinctness as a species, and its description as such may lead to special search for more specimens of it through which a clearer idea of it will be obtainable than the material now available affords. Mr. Smith's plants collected late in the year show but a few passed flowers and some bruised capsules.

The plant differs from *P. spathulifolia,* Craib in the following points:—longer narrowly elliptic not spathulate leaves which are more definitely and acutely cut, the longer farinose flower-pedicel, single bract longer than the pedicel, larger calyx, smaller corolla limb.

470 **Primula minor,** Balf. fil. et Ward.

Epilosa. Rhizoma tunicatum foliis praeteritis siccis contortis obtectum. Folia petiolata floribus coetanea sed post anthesin

accrescentia crassa ad 5 cm. longa ad 8 mm. lata oblongo-spathulata obtusa margine recurva regulariter minute crenato-dentata basi in petiolum vaginantem lamina longiorem anguste alatum attenuata supra sparsim subtus dense luteo-farinosa costa media prominula excepta. Scapus ad 6 cm. altus sub fructu accrescens plus minusve farinosus apicem versus purpur-ascens umbellam unam 8-floram gerens; bracteae purpura-scentes plus minusve farinosae subtus connatae a basi lata vaginante acuminatim angustatae ad 7 mm. longae pedicellis longiores vel aequilongae; pedicelli validi erecti purpurascentes et farinosi sub fructu aucti; anthopodium abstrictum. Calyx breviter tubulosus ad 8 mm. longus extus purpurascens nunc ubique extus intusque luteo-farinosus saepe lineis farinosis intersepalinis solum notatus ultra medium fissus lobis longis ligulatis adpressis apice obtusis vel acutis subcucullatis sine hydathodo conspicuo. Corollae violaceae oculo albo tubus cylindricus supra stamina ampliatus in flore brevistylo ad 1.5 cm. longus in longistylo ad 1.2 cm. longus extus fauce plus minusve farinosus intus annulo conspicuo 5-lobato instructus vix transverse rugosus tenuiter membranaceus, limbi discus 2 mm. latus, lobi patuli anguste obovati vel elliptici ad 1 cm. longi ad 6 mm. lati obscure crenati. Stamina filamentis dis-tinctis antherisque oblongis circ. 2 mm. longis in flore brevistylo supra medium tubi corollini inserta apicibus antherarum 3 mm. ab annulo remotis, in longistylo basin versus inserta calyce inclusa. Ovarium ovoideum; stylus brevis tubo calycis dimidio longior, longus tubo corollini paullo brevior; stigma capitatum lobulatum. Capsula rufa longitudinaliter striata ad 1.4 cm. longa calyce duplo-longior cylindrica angusta apice 5–10 dentibus valvatim dehiscens.

Species affinis *P. pulchellae*, Franch. sed habitu nano, foliis supra farinosis, umbella pauciflora, pedicellis brevioribus floribusque erectis, calycis segmentis longioribus, petalis violaceis integris, capsula longiore recedit.

Yunnan. A-tun-tsu. Alt. 13,000–14,000 ft. A semi-alpine (note tufted habit and very fibrous roots) growing on open mountain slopes under rocks, etc. Situation dry. Not a great variation in colour, usually pale. Attacked by fungus. F. Kingdon Ward. No. 89. May 1911. In Herb. Edin.

Yunnan. F. Kingdon Ward. No. 432. 1913. In Herb. Edin.

This is a dwarf ally of *P. pulchella*, Franch. There are abundant specific distinctions. Apart from the smallness of stature the shorter leaves are farinose above, pedicels are short and erect, lengthening in fruit as do those of *P. pulchella*, Franch. The calyx gives a diagnostic mark in the much longer segments. Then the corolla lobes are entire. Finally,

the capsule is quite twice the size of that in *P. pulchella* and projects far beyond the calyx.

This pretty little species is now in cultivation from Ward's seeds, and has flowered with Bees Ltd. and also at the Royal Botanic Garden, Edinburgh.

Primula nemoralis, Balf. fil.

Herba multiceps efarinosa foliis floribusque coaetaneis. Folia papyracea ad 6 cm. longa ad 2 cm. lata glabra laevia sublyrata saepe drepanoidea obtusa irregulariter dentato-lobata dentibus latis acutis vel obtusis subtus pallidiora basi nonnunquam subpetiolata. Scapus folia subaequans apice cum pedicellis bracteisque minutissime puberulus umbellam unam 4–8-floram gerens; bracteae inaequales exteriores ad 9 mm. longae pedicellos subaequantes a basi lata lanceolatae obtusae nunc apicem versus obscure denticulatae concavae membranaceae uninerviae; pedicelli validi bracteas subaequantes vel eis longiores. Calyx subtubulosus saepe plus minusve rubro-striatus ad 5 mm. longus 5-nervius ad trientem fissus lobis ovatis obtusis minutissime puberulis et ciliatis. Corollae violaceae tubus 9 mm. longus annulo lobato luteo instructus intus supra stamina puberulus infra membranaceus, lobi ad 6 mm. longi obovati bilobuli integri. Floris longistyli antherarum apices ab annulo circ. 2.5 mm. remoti, brevistyli ad annulum attingentes. Ovarium conoideum; stylus longus tubo corollino brevior, brevis calycem subaequans; stigma breviter cylindricum.

Species Sectionis Sonchifoliae bracteis longis concavis membranaceis distinguenda.

Yunnan. Ou Kia. In moist woods. Alt. 9000 ft. Leaves soft. Flowers violet. Coll. E. E. Maire. In Herb. Edin.

Not far removed, I think, from *P. sinuata,* Franch.* The leaf outline in the two plants is not quite the same, as I judge from Franchet's very short description and from a photograph of a Paris sheet of Franchet's type. The inflorescence has more flowers, and the scape is stouter and pedicels longer in Maire's plant. The bracts too are much larger and more involucrate in *P. nemoralis,* Balf. fil. Franchet's plant is so little known that I cannot write about its affinities with the confidence I would like. But I have ample grounds for saying that *P. sinuata,* Franch., has no place in the Soldanelloid Section of Primula alongside of *P. Wattii,* King where Pax places it. Pax had not seen the plant and gives it its position on the strength of Franchet's comment that its leaves are like those of *P. Wattii,* King; but then Franchet adds the form of corolla and that of the calyx are very different in the two plants.

* Franchet in Bull. Mus. Hist. Nat. Paris, i (1895), 65.

P. sinuata, Franch. is I have little doubt one of the Sonchifolia series.

1689 **Primula oresbia,** Balf. fil.

Perennis albofarinosa rhizomate brevi. Folia graciliter petiolata ad 5 cm. longa; lamina ovata vel elliptica ad 1.7 cm. longa ad 1.4 cm. lata profunde pinnatim inciso-dentata cum dente apicali dentibus mucrone hydathodali corneo terminatis supra viridis glandulis capitatis obscure pulverulenta subtus intense albofarinosa basi subito truncatim vel late cuneatim in petiolum contracta; petiolus ad 2.5 cm. longus vix alatus plus minusve albofarinosus. Scapus ad 12 cm. altus plerumque brevior validus albofarinoso-puberulus umbellam subsecundam 5–6-floram gerens; bracteae plus minusve albofarinosae 6–8 mm. longae lineari-lanceolatae crassiusculae acutae basi subvaginatae exteriores pedicellis longiores (saepe duplo) interiores breviores; pedicelli albofarinosi subnutantes; anthopodium subnullum. Calyx poculiformis angulatus 6 mm. longus dense albofarinosus ultra medium fissus lobis erectis ad 4–5 mm. longis anguste lanceolatis acuminatis hydathodo corneo terminatis nervo medio prominente. Corollae lilacinae tenuis ubique plus minusve albofarinosae tubus exannulatus 8 mm. longus cylindricus intus in floribus omnibus transverse rugosus, limbi subconcavi vix ampliati discus 2 mm. diam. valde coloratus et dense albofarinosus, lobi obcordati bifidi. Antherarum apices in flore longistylo ab ore corollae circ. 4.5 mm. remoti in brevistylo ad orem sed haud exserti. Ovarium parvum globosum; stylus longus 6.5 mm. longus exsertus, brevis 1 mm. longus; stigma subglobosum. Capsula angusta oblonga 3–4 mm. longa calyce inclusa valvis primariis bifidis ad basin dehiscentibus.

Species *P. incisae*, Franch. affinis sed albofarinosa.

Hunan. Summit of Yo-Chow. Alt. 10,300 ft. E. E. Maire. In Herb. Edin.

I have not seen enough of *P. incisa*, Franch., to enable me to obtain a clear picture of its features, and the descriptions are not satisfactory. Franchet's type came from Muping, collected by David, and all Muping plants are very distinct. This I have not seen. With it Pax associates a plant from Mt. Omei collected by Faber and two plants collected by Pratt at Tatsienlu under the Nos. 31 and 161. In order to do this Pax has to modify Franchet's description in important particulars.

Franchet regarded his *P. incisa*, Franch., as near to *P. involucrata*, Wall., but very distinct by the scabrid leaves with incised lobes. I cannot subscribe to the affinity, but Franchet's

reference to scabrid leaves as diagnostic seems to indicate a prominent mark. Pax, however, describes *P. incisa*, Franch. as having also glabrous leaves, and certainly Pratt's plants have leaves with this character. But Pratt's plants have not the glabrous scape which both Franchet and Pax describe for *P. incisa*, Franch. Then Pax introduces the character of golden meal on the pedicels—that is apparent in Pratt's plant No. 31, and I have seen it on two other specimens—Henry's No. 134 and Wilson's No. 4046A in Kew Herbarium. It is surely one that Franchet would not have overlooked in the Muping plant to which he ascribed golden meal sparingly on the calyx. Pax says of the calyx, "glaber vel intus farinosus."

Without doubt *P. incisa*, Franch. is a type around which are to be grouped microforms which further investigation must sift out.

The species I describe here under the name *P. oresbia*, Balf. fil., belongs to the aggregate but is certainly different from Franchet's *P. incisa*, Franch. and does not belong to Pax's chimaera. The intensely white farina on the under side of the leaves and all over the inflorescence, and particularly the calyx, is a mark of separation, and I have seen no form amongst those which I have examined with which our plant conforms exactly. Specimens of this *incisa* aggregate which I have seen in the Kew Herbarium are Henry, Nos. 134, 8869; Pratt, Nos. 31, 161, 258; Soulié, No. 383; Wilson, Nos. 4046, 4046A, 4046B. The form most like *P. oresbia*, Balf. fil. is Henry's No. 8869, but it has golden meal. There are also some good specimens in the Herbarium of the British Museum, but I have not yet been able to undertake the task of critical examination and comparison of them and the Kew specimens.

The examination of *P. oresbia*, Balf. fil. confirms me in the opinion I expressed at the Primula Conference that *P. incisa*, Franch. does not find its natural place in the Section Soldanelloides. These two species seem to occupy a position linking Soldanelloides with Bella and Yunnanensis.

1796 **Primula petrophyes,** Balf. fil.

Glabra efarinosa rhizomate breve foliisque rosulatis. Folia ad 3.5 cm. longa; lamina ad 5 mm. lata coriacea glauca anguste lanceolata acuminata a medio deorsum in petiolum aequilongum membranaceo-alatum vaginantem gradatim attenuata margine linea alba cartilaginea et denticulis subaculeatis recurvis notata. Scapus ad 8 cm. altus superne atropurpureus rugosus minute pulverulentus umbellam 3–5-floram unilateralem subnutantem gerens; bracteae purpurascentes exteriores ad 7 mm. longae a basi lata vaginante subauriculata carinata et pedicello con-

crescente elongato-lanceolatae acutae pulverulentae vena media prominula interiores minores; pedicelli validi bracteis multo breviores ad 4 mm. longi pulverulenti; anthopodium obconoideum conspicuum. Calyx ad 5 mm. longus corollae tubo longior campanulatus pulverulentus costis 5 vix elevatis notatus ultra medium fissus lobis a basi lanceolatis acutis vena media notatis. Corollae coeruleae firmae in flore longistylo tubus ad 4 mm. longus calyce brevior extus pulverulentus intus puberulus haud rugosus ad orem annulo 5-lobato instructus, limbi concavi discus ad 3 mm. latus farinosus, lobi ad 2.5 mm. longi subrotundati vel oblongi integri vel paullo emarginati. Stamina in flore longistylo filamentis brevissimis antherisque 1–2.5 mm. longis supra medium tubi corollini sine lobis interstaminalibus inserta. Ovarium globosum; stylus longus validus limbi corollini discum aequans; stigma capitatum depressum.

P. leimonophilae, Balf. fil. affinis sed minor et bracteis pedicellis longioribus, calyce campanulato, annulo ad orem corollae, loborum interstaminalium inopia diversa.

Hunan. Rocky plateaux of Yo-Chow. Alt. 10,200 ft. Flowers blue. Maire. In Herb. Edin.

A small species like a miniature *P. leimonophila,* Balf. fil. but it has many points of difference, of which I may note specially that of the flower. The corolla tube has a moderate-sized annulus which lies quite at the mouth of the corolla tube, whilst in *P. leimonophila,* Balf. fil. there is a very large inflated annulus lying a little below the mouth of the tube. The corolla lobes are small and rounded and hardly divergently emarginate. Then the short stamens—I have only seen the long-styled flower—have no interstaminal lobes forming an androecial annulus as in *P. leimonophila,* Balf. fil. Of other diagnostic characters note the long bracts, short stout pedicels, campanulate calyx with the intercostal areas not broad and pergamentaceous, and then the small linear foliage.

It may be this is an alpine microform of *P. leimonophila,* Balf. fil. but by the features to which I have drawn attention it may be readily recognised.

It belongs to the Amethystina Section.

533 **Primula philoresia,** Balf. fil. et Ward.

Perennis pygmaea rhizomate tenui ramoso foliis siccis anni praeteriti obtecto. Folia parva petiolata ad 1.2 cm. longa; lamina ovata ad 5 mm. longa 4 mm. lata crassa apice rotundata margine subintegra revoluta supra minutissime puberula subtus albo-farinosa basi subito in petiolum angustum membranaceo-alatum lamina longiorem contracta. Scapus 8 mm. longus foliis brevior puberulus florem unum pro planta magnum

gerens; bracteae tres inaequales puberulae virides sparsim farina conspersae involucrum subflorale formantes, exterior ab insertione lata ovato-acuminata 6 mm. longa interiores duae minores; pedicellus fere nullus. Calyx 6 mm. longus late campanulatus vix ad medium fissus viridis vel purpurascens extus farina conspersus lobis oblongis integris margine minutissime ciliatis. Corollae violaceae (?) tenuis tubus 9 mm. longus calycem superans extus puberulus intus annulatus et glanduloso-puberulus erugosus, limbi plani discus ad 2 mm. latus, lobi obcordati ad 8 mm. longi ad 7.5 mm. lati. Antherae in flore brevistylo breves ad medium tubi corollini insertae apicibus circ. 3.5 mm. ab annulo remotis. Ovarium globosum; stylus 2 mm. longus; stigma discoideum.

Species foliis et habitu *P. dryadifoliae*, Franch. sed multo minor et scapo unifloro foliis breviore, flore erecto, corollae tubo calycem superante, notis aliisque diversa.

N.W. Yunnan. Mekong-Salween divide near A-tun-tsu. 15,000 ft. F. Kingdon Ward. 18th July 1913. No. 798. In Herb. Edin.

A charming dwarf species which is so like *P. dryadifolia*, Franch. in form of foliage that one might at first regard it as a small form of that species. The leaves are however different apart from size in this, that their upper surface is covered with very short hairs which are absent in *P. dryadifolia*, Franch. The whole flower structure is different. The scape bears but one flower and is enclosed in the foliage; in *P. dryadifolia*, Franch. it is pushed out well beyond the leaves. The flower is erect, not slightly nodding. The calyx much shorter than the corolla suffices to tell this species at once from *P. dryadifolia*, Franch. where the corolla is shorter than the calyx.

Primula prionotes, Balf. fil. et Watt.

Epilosa rhizomate *P. sikkimensis*, Hook. paucifolia. Folia petiolata ad 18 cm. longa ad 3 cm. lata; lamina membranacea efarinosa elongata oblonga vel anguste elliptica obtusa vel acuta margine regulariter dentato-serrata subtus pallidior basi cuneatim abrupte vel gradatim in petiolum vix alatum vix vaginatum laminam aequantem attenuata. Scapus tenuis ad 35 cm. longus apice luteo-farinosus umbellam plurifloram gerens; bracteae angustae conduplicatae ad 9 mm. longae a basi lato sursum attenuatae obtusae vel acutae nunc quasi foliaceae carinatae basique subtus incrassatae; pedicelli filiformes plus minusve farinosi subreflexi. Calyx tubuloso-campanulatus ad 6 mm. longus corollae tubo multo brevior extus 5-costatus glaber plus minusve purpurascens et lineis purpureis striatus ad trientem fissus lobis deltoideo-triangulari-

bus hydathodo corneo terminatis intus dense luteo-farinosis. Corollae purpureae tubus tubuloso-infundibuliformis in flore longistylo ad 1.2 cm. longus supra stamina ampliatus in brevistylo brevior exannulatus intus infra stamina rugosus, limbi concavi luteo-farinosi discus 4 mm. latus, lobi rotundati vel oblongi erecti ad 5 mm. longi paullo emarginati. Antherae fere sessiles 3 mm. longae in flore longistylo basin tubi corollini versus inserta calyce multo breviores, brevistylo ad orem corollae inserta. Ovarium ovoideum superne incrassatum; stylus longus exsertus, brevis vix calycis tubum superans; stigma capitatum.

Planta inter species himalayenses sectionis Sikkimensis floribus purpureis distincta.

Tibet. Karo La. Alt. about 16,500 ft. Capt. H. J. Walton, I.M.S. July 1904. In Herb. Calc.

Sir George Watt recognised the distinctness of this plant as a species and named it on the Calcutta sheets *P. serrata*, sp. nov., but he did not publish a description. Unfortunately the name he suggested has been absorbed by Gusmus for a hybrid *P. minima* × *P. Wulfeniana*, which is not uncommon in gardens. The plant is the first Indian species as yet known of the Sikkimensis Section which has purple flowers, and its occurrence is of interest because we have already from China both a purple and yellow series of this Section. The only specimens known of *P. prionotes*, Balf. fil. et Watt are those collected by Capt. Walton during the Tibet Frontier Expedition in 1904.

Primula pseudomalacoides, L. B. Stewart.

Perennis multiceps pilosa rhizomate tenui foliis rosulatis petiolatis. Folia ad 10 cm. longa; lamina ad 4 cm. longa ad 2.5 cm. lata oblongo-elliptica vel elliptica crassa utrinque pilis albis hirtella subtus albo-farinosa costa media et venis primariis erubescentibus prominulis apice rotundata margine lobulata lobulis serrato-dentatis dentibus hydathodo corneo terminatis basi abrupta lateribus symmetricis vel asymmetricis sinum vix formantibus vel subcuneatis vel subtruncatis; petiolus lamina duplo-longior erubescens succulentus pilosus evaginans. Scapi plurimi graciles deinde decumbentes ad 40 cm. longi sparsim albo-farinosi verticillos plurifloros plures et umbellam terminalem gerentes; bracteae parvae ad 5 mm. longae lineari-lanceolatae acutae utrinque albo-farinosae; pedicelli filiformes inaequales ad 4 cm. longi albo-farinosi divaricati apice deflexi; anthopodium fere nullum. Calyx ad 5 mm. longus campanulatus dense albo-farinosus tubo intus basi excepto vix ad medium fissus, lobis patentibus longe triangularibus acutis. Corollae

pallide lilacinae luteo-oculatae oculo albo-cincto tubus basi albidus supra flavidus extusque sparsim farinosus in flore brevistylo supra stamina ampliatus infra cylindricus ad 6 mm. longus ad orem lineis strumosis 10 (5 antipetalis majoribus) luteis puberulis annulatus, lobi patuli leviter recurvi obovati aperti profunde emarginati ad 5 mm. longi. Stamina in flore brevistylo ad medium tubi corollini inserta filamentis distinctis antherarum apicibus ab ore circ. 2 mm. remotis. Ovarium globosum; stylus viridis, brevis calycis tubo brevior; stigma parvum globosum.

Microforma *P. malacoidis*, Franch. foliis minoribus haud late cordatis, scapis tenuioribus decumbentibus diversa.

Yunnan. G. Forrest.

P. malacoides, Franch. is a species with a wide distribution from the Shan States of Burma through Yunnan, both North and South. Over its wide distribution it presents a considerable range of variation, and several of its forms have already been described as distinct species. A supply of material sufficient to justify the mapping out of the microform variations of the aggregate is not yet available, but what we have seems to show that the type may be monocarpic or pluricarpic, and some of the monocarpic forms are annual. The forms range themselves in two series: one in which with generally larger leaves are associated tall scapes with many whorls of flowers—of this *P. malacoides*, Franch. is the centre; the other with smaller leaves and shorter scapes with one umbel or one or two whorls of flowers—the type of this is *P. Forbesii*, Franch.

Under the name *P. Forbesii*, Franch. a plant was introduced to cultivation in 1891 by Vilmorin. It was monocarpic annual. The *P. Forbesii*, Franch. of cultivation at the present day is pluricarpic perennial forming stout rhizomes. It may be that two different microforms have been cultivated under the name.

Plants of the larger-leaved tall-scaped type we owe in cultivation to Bees, Ltd., raised from seed collected by George Forrest. The first plants raised and flowered—see figure in Gardeners' Chronicle, Ser. 3, 44 (1908), 396, figs. 164, 165—belonged to the microform here described, not to the true *P. malacoides*, Franch. as that is shown in the Paris Herbarium and as it appeared later in plants raised also from Forrest's seed. A distinction between the microforms was not made by Mr. Forrest in the field—and small wonder. Their difference was first noticed in cultivation by Mr. Laurence B. Stewart, who gave the name *P. pseudomalacoides* to the microform. It is a slenderer plant than true *P. malacoides*, Franch. with leaves which remain more prostrate and have the oblong rather than the ovate form; the flowers are

smaller. As yet the thrum-eyed plant only of *P. pseudomalacoides*, L. B. Stewart has been seen, and no seed has been obtained from it except by crossing with true *P. malacoides*, Franch. It is readily propagated by division. The fact that it crosses easily with *P. malacoides*, Franch. means that already in cultivation numerous progeny exist which must be the result of such crossing, and the distinction between the forms easily made when the true forms are seen side by side may not be generally recognised.

Primula pulchelloides, F. K. Ward.

Epilosa foliis floribusque coaetaneis. Folia ad 3.5 cm. longa ad 10 mm. lata lineari-lanceolata subcrassa supra smaragdina subtus dense luteo-farinosa apice obtusa margine vix revoluta subtiliter et late serrato-crenata basi longe angustata et subpetiolata. Scapus rigidus ad 18 cm. altus saepius minor farina lutea conspersus umbellam multifloram (ad 8) erectam gerens ; bracteae virides plus minusve luteo-farinosae exteriores a basi lata acuminatae vel lineari-subulatae ad 1 cm. longae auriculatim vaginatae pedicellum amplectantes ; pedicelli rigidi ad 2.5 cm. longi saepius breviores sparsim luteo-farinosi ; anthopodium obconoideum 1 mm. longum viride ab flore subtiliter constrictum. Calyx viridis ad 8 mm. longus fere ad medium fissus, tubo angulato intus efarinoso extus luteo-farinoso costis exceptis lobis lanceolatis vel elongato-triangularibus aequalibus acutis carinatis crassis corollae tubo adpressis intus ac extus carina excepta luteo-farinosis. Corollae pallide violascentis fauce aurantiaca tubus cylindricus in flore brevistylo supra stamina ampliatus 1 cm. longus stramineus efarinosus vel farina lutea conspersus intus minutissime puberulus transverse rugosus annulatus annulo 10-lobulato, limbi patentis discus vix 1 mm. latus, lobi ad 7 mm. longi obcordati vel oblongo-obovati firmi bilobatuli segmentis integris extus plus minusve luteo-farinosi. Stamina filamentis brevissimis et antheris 2 mm. longis floris longistyli prope basin tubi corollini inserta apicibus antherarum ab annulo 6 mm. remotis, brevistyli 1 mm. ab annulo. Ovarium magnum dolioforme 2.5 mm. longum stylopodio umbraculiformi incrassatum ; stylus longus fere tubum corollae aequans brevis calyce brevior ; stigma discoideum umbilicatum vix crenulatum pallide viride. Capsula 8 mm. longa 1.5 mm. lata ultra calycem haud auctum extensa cylindrica pallide brunnea laevigata ab apice calyptratim incrassata valvis 5–10 ad medium dehiscens ; columna placentifera angusta. Semina plana ellipsoidea 0.75 mm. longa minute tuberculata.

Ex affinitate *P. pulchellae*, Franch. sed minor foliis angustioribus et floris colore distincta.

N.W. Yunnan. A-tun-tsu. 13,000 ft. July 1911. F. Kingdon Ward. In Herb. Edin.

A plant now in cultivation from seeds sent by Ward to Bees, Ltd. It is quite a good plant, but not the equal of *P. pulchella*, Franch. in depth of colour of foliage or flower. It is a smaller species than *P. pulchella*, with which it has many points of resemblance. The narrower smaller leaves easily distinguish it.

Primula rhodantha, Balf. fil. et W. W. Sm.

Efarinosa epilosa radicibus ramosissimis gracillimis foliisque petiolatis rosulatis erectis vel subpatulis sub anthesi squamis elongatis paucis alabastri cinctis. Folia floribus coaetanea ad 7 cm. longa saepe in rosulis parvulis multo minora; lamina crassiuscula elliptica vel oblongo-elliptica vel anguste obovata vel oblanceolata ad 3 cm. longa ad 1 cm. lata apice obtusa vel rotundata margine subcartilaginea plus minusve denticulata subtus pallidior utrinque minute foveolato-glandulosa et saccis tanniniferis punctata basi in petiolum ad 5 cm. longum anguste alatum et longe vaginantem cuneatim breviter contracta vel in petiolum brevem vix distinctum attenuata. Scapus foliis brevior et immersus vel ea subaequans ad 6 cm. altus robustus umbellam ad 8-floram (rarius 1-) gerens; bracteae ad 3.5 mm. longae a basi lata rotundata et subinflata cucullata rugosa lanceolato-acuminatae vel caudato-acuminatae saccis tanniniferis punctatae infra carinatae et sacco brevi vix 1 mm. longo rotundato appendiculatae; pedicelli stricti erecti graciles ad 1.3 cm. longi; anthopodium longum obconoideum. Calyx ad 5 mm. longus cylindrico-campanulatus sparsim punctatus et erubescens ad trientem fissus, lobis elongato-triangularibus acutis. Corollae roseae tubus infra anguste cylindricus supra stamina expansus ad 9 mm. longus extus glaber intus supra stamina puberulus obscure rugosus ad orem strumis anti-petalinis notatus limbi concavi discus ad 2 mm. latus, lobi obovati ad 5 mm. longi ad medium fissi. Stamina filamentis conspicuis et antheris 1.5 mm. longis in flore brevistylo apicem tubi corollini versus antherarum apicibus ab ore 1.5 mm. inserta, in flore longistylo in triente infimo tubi corollini calyce inclusa inserta. Ovarium oblongo-ovoideum in triente superiore incrassatum; stylus brevis tubum calycis subaequans, longus tenuis tubo corollino dimidio-brevior calyce dimidio-longior; stigma ovoideum.

P. roseae, Royle affinis, habitu, foliis petiolatis, scapo vix foliis longiore, pedicellis tenuibus et notis aliis distincta.

Afghanistan. Kurrum Valley. Shéndtoi, ravine at 9000–10,000 ft. Very local. Aitchison. No. 462. 1879. In Herb. Kew. et Calc.

Afghanistan. Kurrum Valley. Harsukh. No. 14,931. In Herb. Duthie.

Aitchison says of this plant, which he places as a variety of *P. rosea*, Royle: "This variety has each flower supported on a long slender pedicel, and the tube of the corolla is longer and narrower than that of the type." This is a just diagnosis, and the plant, whilst of the *P. rosea*, Royle, aggregate, is so distinct that its specific distinction is warranted. See p. 23.

1202

Primula riparia, Balf. fil. et Farrer.

Parva vix rhizomata foliis paucis petiolatis. Folia ad 7 cm. longa; lamina ad 2.5 cm. longa ad 2 cm. lata cordata vel late ovata vel subrotundata margine lobulato-dentata lobulis crenulatis pilis longis fimbriata sinu angusto supra albido-pilosula subtus pilis longis albis praesertim ad venas hirsuta; petiolus laminam superans vel aequans exalatus lanato-hirsutus vagina brevi. Scapus folia excedens ad 9 cm. longus viridis infra plus minusve pubescens superne glanduloso-puberulus nunquam barbatus umbellam paucifloram (ad 5) gerens; bracteae parvae ad 5 mm. longae a basi lineari-lanceolatae virides glanduloso-puberulae obtusae; pedicelli tenues erecti ad 2 cm. longi glanduloso-puberuli; anthopodium parvum discoideum. Calyx ad 6 mm. longus campanulatus extus sparsim glanduloso-puberulus tubo laete viridi venuloso ultra medium fissus lobis oblongis vel elongato-ovatis subacutis venulis conspicuis striatis ad apicem hydathodo immerso terminatis. Corollae lilacinae tubus flavescens calyce paullo longior ad 7 mm. longus membranaceus extus sparsim glanduloso-puberulus intus haud rugosus supra stamina puberulus annulatus annulo magno lobis 10 luteis antipetalis lobulis minoribus interpetalis conjunctis, limbi plani discus ad 1 mm. latus, lobi aperti obcordati ad 5 mm. longi divaricatim bifidi. Stamina filamentis latis et antheris 1.25 mm. longis supra medium tubi corollini inserta antherarum apicibus fere ad orem attingentibus. Ovarium ovoideum; stylus tubum corollae aequans; stigma parvum stylo paullo latius lobulatum.

Species a *P. neurocalyce*, Franch. scapo, bracteis, pedicellis, calyce glanduloso-puberulis nunquam lanato-hirsutis distinguenda.

Kansu. Farrer and Purdom. No. 33. 1914. *P. obconica* microform. Twice seen only: first, three clumps beside a little watercourse above the wicked and murderous village of Chago, and again, more freely, on one little shady coppiced bank below, at 7000–8000 ft. May 6, 8, 1914. In Herb. Edin.

Primula riparia, Balf. fil. et Farrer is a close ally of *P. neurocalyx*, Franch. differing chiefly in the absence of the woolly coating to the scape, bracts, pedicels, and calyx. In

P. neurocalyx, Franch. the flower at the anthopode is densely bearded. The question arises—Is *P. riparia*, Balf. fil. et Farrer to be considered as a microform of *P. neurocalyx*, Franch.? In the Obconico-Listeri series we know of such microforms, and it may be we have a like condition here. The plants are certainly much alike.

Primula rosiflora, Balf. fil. et W. W. Sm.

Efarinosa epilosa rosulata foliis paucis petiolatis patulis. Folia ad 3.5 cm. longa ; lamina crassiuscula elliptica vel oblonga ad 2 cm. longa ad 1 cm. lata elliptica vel oblonga obtusa margine obscure remoteque denticulata utrinque saccis tanniniferis punctata deorsum in petiolum alatum laminam subaequantem vel ea breviorem gradatim attenuata. Scapus brevissimus vix ad 3 mm. longus umbellam ad 4-floram foliis immersam gerens ; bracteae ad 5 mm. longae basi latae auriculatae cucullatae sursum lanceolato-acuminatae membranaceae infra sacco gibboso brevi instructae ; pedicelli ad 1.5 cm. longi tenues erecti divaricati ; anthopodium longum obconoideum. Calyx anguste campanulatus viridis vel paullo erubescens ad vel ultra medium fissus, lobis oblongis vel oblongo-lanceolatis acutis. Corollae roseae tubus anguste cylindricus in flore brevistylo 1.4 cm. longus tenuiter membranaceus vix rugosus supra stamina paullo ampliatus puberulus ad orem annulatus annulo delicato 10-lobato, limbi discus 1.5 mm. latus, lobi aperti obcuneati 7 mm. longi profunde divaricatim bifidi segmentis nunc sectilibus. Stamina in flore brevistylo filamentis brevibus et antheris angustis 2 mm. longis apicem tubi corollini versus antherarum apicibus 2.5 mm. ab annulo remotis inserta. Ovarium globosum stylopodio incrassato 5-areolato coronatum ; stylus brevis 2 mm. longus calyce brevior ; stigma ovoideum integrum.

Species ex affinitate *P. roseae*, Royle, *P. elegantis*, Duby et *P. rhodanthae*, Balf. fil. et W. W. Sm. scapo brevissimo, pedicellis longis, et corolla lobatim annulata distinguenda.

Chitral. 4900 ft. Harriss. No. 16,334. 4th June 1895. In Herb. Kew. et Edin.

Chitral. 5200 ft. Harriss. No. 16,335. 7th June 1895. In Herb. Calc.

Chitral. 10,000 ft. Gilg. In Herb. Kew.

Duthie has labelled this plant on the herbarium sheet as a variety of *P. rosea*, Royle and it is a member of that aggregate, but it is definitely diagnosed by the extremely short scape and the well-developed annulus in the corolla. See p. 23.

1679 **Primula rupicola,** Balf. fil. et Forrest.

Luteo-farinosa puberula rhizomate multicipite crasso foliis plurimis siccis vetustis obtecto. Folia petiolata ad 10 cm. longa

plerumque minora ; lamina membranacea oblongo-lanceolata vel anguste obovata vel anguste elliptica ad 3 cm. longa ad 1.5 cm. lata obtusa margine subsinuata grosse irregulariter dentata vel bidentata ciliata deorsum in petiolum alatum laminam aequantem vel ea breviorem gradatim attenuata supra molliter puberula subtus molliter pubescens praesertim ad venas et juventute dense maturitate sparsim aureo-farinosa. Scapus ad 9 cm. altus plus minusve puberulus vel farinosus umbellam erectam ad 8-floram gerens ; bracteae lineari-subulatae ad 1 cm. longae basi vaginatae subtusque paullo incrassatae extus sparse intus dense luteo-farinosae ; pedicelli bracteis longiores ad 2 cm. longi graciles stricti plus minusve luteo-farinosi vel puberuli ; anthopodium conspicuum obconoideum. Calyx 8–10 mm. longus globoso-campanulatus 5-costatus costis intense viridibus vel purpurascentibus intervallis pergamentaceis pallidioribus extus plus minusve farinosus vel puberulus intus dense luteo-farinosus ad trientem vel dimidium fissus lobis lanceolatis acutis ciliatis. Corollae roseae (Forrest) flavo-oculatae tubus albidus 1.2–1.4 cm. longus purpureo-venosus in flore brevistylo cylindricus supra stamina ampliatus in flore longistylo infundibuliformis extus sparsim farinosus intus pubescens et annulo lobato instructus, limbi discus concavus 2 mm. latus pubescens, lobi patuli obovati vel obcordati 8 mm. longi bifidi. Stamina filamentis brevissimis antheris latis 1.5 mm. longis in flore brevistylo in triente superiori tubi corollini ultra calycem inserta antherarum apicibus 3 mm. ab annulo remotis, in flore longistylo basin tubi corollini versus inserta calycis tubo inclusa. Ovarium ovoideum in triente superiore incrassatum ; stylus brevis calycis tubum vix superans, longus tubo corollae quadrante brevior ; stigma magnum globosum. Capsula ad 5 mm. longa cylindrica calyce membranaceo brunneo-punctato extus puberulo intus farinoso inclusa ab apice valvis 5 obtusis brunneis nitentibus dehiscens ; placenta breviter stipitata oblonga. Semina vix 1 mm. longa oblonga angulata rufo-brunnea testa obscure areolata.

Species forsan *P. Souliei*, Franch. affinis.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 12,000 ft. Plant of 3–7 inches. Flowers rose, eye yellow. On boulders and open stony pastures. G. Forrest. No. 10,338. July 1913. In Herb. Edin.

This is one of the section of Primulas with angular ribbed calyx and non-gibbous bracts which have a hardened cushion more or less developed. It has also a well-developed annulus. For the present I put it in the Section Souliei.

Primula sciophila, Balf. fil. et Ward.

Perpusilla radicibus rubris epilosa dense caespitosa; rhizoma foliis siccis praeteritis obtectum. Folia petiolata rosulata ad 1.8 cm. longa; lamina orbicularis vel oblonga ad 7 mm. diam. petiolo duplo-brevior inciso-dentata dentibus acutis basi cuneata in petiolum longum anguste alatum attenuata, subtus luteo-farinosa. Scapus brevissimus 1–2 mm. longus uniflorus 2-bracteatus luteo-farinosus; bracteae luteo-farinosae inaequales alternae inferior major ad 1 cm. longa pedicellum calycemque aequans vel brevior foliacea petiolata lamina anguste oblonga acuta gradatim in petiolum ligulatum aequilongum attenuata, superior minor nunc squamiformis nunc inferiori similis et subaequans; pedicellus foliis brevior luteo-farinosus ad 5 mm. longus; anthopodium discoideum. Calyx poculiformis nigro-costatus ad 6 mm. longus ad medium fissus extus intusque luteo-farinosus lobis oblongis acuminatis sparsim nigro-venosis. Corollae purpureo-lilacinae tubus venis nigro-purpureis striatus fauce extus minutissime puberulus intus pulvino denso pilorum alborum occlusus, in flore brevistylo 1 cm. longus angustus cylindricus sursum ampliatus infra glaber basin versus rugosus in flore longistylo 8 cm. longus latior intus plus minusve pilis ubique vestitus, limbi patuli lobi obcuneati bifidi segmentis divaricatis. Stamina antheris vix 1 mm. longis filamentis brevibus in flore brevistylo sub pulvino hirto inserta, in longistylo ad basin tubi corollini supra ovarium inserta. Ovarium globosum; stylus longus exsertus, brevis calyce dimidio-brevior; stigma capitatum.

Sectionis Bellae species ex affinitate *P. bellae,* Franch. et *P. nanobellae,* Balf. fil. et Forrest bractearum forma et dispositione omnino differt.

Upper Burma. Ridge of Naung Chaung—Nwai divide. Growing in masses under shade of granite cliffs or in crevices of rocks with moss. Damp and dark situations, exposed ridge. Alt. 13,000 ft. Rare, only one patch seen. Flowers pale or dark purple lilac. F. Kingdon Ward. No. 1784. 15th July 1914. In Herb. Edin.

This species at a casual glance might well pass for the micro-form of *P. bella,* Franch. which is named *P. nanobella,* Balf. fil. et Forrest but close examination shows that, whilst it has the pompon of occluding hairs of the Bella type, it has an altogether different form and arrangement of the bracts. To *P. coryphaea,* Balf. fil. et Ward another Burmese plant, it is related, but that plant is much smaller, and has bracts of a different form and disposition. It is a link between the Chinese *P. bella,* Franch. and the Bhutan *P. indobella,* Balf. fil. et W. W. Sm.

1199 **Primula seclusa,** Balf. fil. et Forrest.

Herbacea villosa foliis petiolatis. Folia ad 25 cm. longa; lamina tenuiter membranacea rotundato-cordata ad 15 cm. diam. sinuato-lobata margine ciliata hydathodis corneis denticulata sinu basali aperto utrinque pilis mollibus longis vestita; petiolus fere lanatus laminam aequans. Scapus robustus ad 40 cm. altus villosus verticillos 2–3 distantes 6–9-floros gerens; bracteae membranaceo-foliaceae lineari-lanceolatae acutae villosae ad 1.5 cm. longae; pedicelli validi villosi bracteis longiores. Calyx campanulatus viridis ad 11 mm. longus post anthesin accrescens corollae tubum aequans molliter villosus ad medium fissus lobis inaequalibus lanceolatis acutis hydathodo terminatis pluriveniis. Corollae rubrae tubus ad 11 mm. longus obliquus tenuiter membranaceus non rugosus annulo angusto, lobi obovati fimbriati ad 2 mm. longi apice fissi. Stamina ad medium tubi corollini inserta antherarum apicibus ab annulo circ. 2 mm. remotis. Ovarium globosum; stylus calyce brevior staminibus aequilongis. Capsula calyce lignoso prominenter venuloso inclusa.

P. molli, Nutt. proxima foliorum calycisque magnitudine distinguenda.

Yunnan. Shweli-Salween divide. Alt. 10,000 ft. Lat. 25° 10′ N. In shady thickets. May 1913. G. Forrest. No. 12,059.

Upper Burma. Near Feng-shui-Ling pass, divide between Irrawaddy system and head waters of Shweli. 8000 ft. In damp deeply shaded situations in the rain forest (also on a clay bank amongst undergrowth by the roadside, less heavily shaded). Flowers deep crimson in centre, fading irregularly to paler crimson on lobes. Corolla slightly oblique. Flowers June–July. F. Kingdon Ward. No. 1632. 4th June 1914.

A large coarse-leaved plant with many bright flowers.

1201 **Primula sinomollis,** Balf. fil. et Forrest.

Herbacea rhizomate carnoso ramoso vaginis foliorum praeteritorum obtecto. Folia petiolata ad 15 cm. longa; lamina late elliptica cordata vel subrotundato-cordata ad 10 cm. diam. coriacea margine subrevoluta obscure sinuato-lobata hydathodis denticulata sinu basali aperto supra areolato-sulcata breviter pilosa subtus intricato-venulosa venis prominulis hirsutis; petiolus lamina brevior crassus erubescens dense hirsutus basi expansus. Scapi plurimi ad 30 cm. alti tenues erubescentes villosi post anthesin saepe decumbentes umbellam terminalem et verticillos plurimos (ad 10) 4–6-floros inter se distantes gerens; bracteae parvae ad 8 mm. longae lineari-lanceolatae acuminatae glanduloso-pilosae; pedicelli horizontaliter patentes ad 12 mm. longi stricti filiformes glanduloso-puberuli. Flores

subobliqui. Calyx ad 6 mm. longus pilis longis glandulosis vestitus tubo obconico lineis 5 viridibus nervosis interstitiis albo-membranaceis notato ad medium fissus lobis anguste lanceolatis acuminatis patentibus pluriveniis membranaceo-alatis apice hydathodo terminatis. Corollae annulatae ore intense rubro-purpureo lobis pallidioribus linea purpurea centrali tubus calycem duplo superans tenuis 8–10 mm. longus intus sub lobis prominulis purpureis annuli viridi-lineatus, limbus fere ad basim fissus, lobis ad 9 mm. longis obcordatis integris non ciliatis profunde (ad 3.5 mm.) emarginatis. Antherae connectivo albo lobis purpureis in flore longistylo apicibus ab annulo 3 mm. remotis in brevistylo annulum attingentibus. Ovarium ovoideum viride apice conicum; stylus longus vix tubo corollino brevior, brevis vix calycem aequans; stigma discoideum flavo-viride. Capsula calycem vix auctum paullo superans stylopodio conico coronata valvis crustaceis dehiscens.

Species Sectionis Mollis a *P. cinerascente*, Franch. cui proxima est foliis majoribus rugosis, scapis longis pluri-verticillatis, calycis pilosi sinubus membranaceis differt. A *P. molli*, Hook. scapo tenuiore calyce multo minore notisque aliis distincta.

Yunnan. Western flank of the Salween Valley above Ho-mo-chu. Lat. 25° 5′ N. Alt. 7000 ft. April 1910. G. Forrest, No. 5523. Plant of 6–15 inches. Flowers bright rose, faintly fragrant. Dry shady situations in mixed and pine forests. In Herb. Edin.

Yunnan. Hills to the east of Tengyueh. Lat. 25° N. Alt. 6000 ft. May 1912. G. Forrest. No. 7569. Plant of 6–20 inches. Flowers magenta-rose with eye greenish-white, fragrant. Pasture-land in side valleys. In Herb. Edin.

Yunnan. Shweli-Salween divide. Salween Valley. Lat. 25° 5′ N. Alt. 7000–8000 ft. May 1913. G. Forrest. Nos. 9807, 9855. Plant of 12–20 inches. Flowers rose, eye yellow, faintly fragrant. Shady situations in thickets. In Herb. Edin.

1934 Var. **alba,** Balf. fil. et Forrest.

Forma floribus albis oculo roseo.

Yunnan. Side valley on the hills to the east of Tengyueh. Lat. 25° N. Alt. 6000 ft. May 1912. G. Forrest. No. 7619. Sport of and growing with No. 7569. Plant of 18 inches. Flowers almost white with a dark rose centre. Pasture-land In Herb. Edin.

1725 **Primula sphaerocephala,** Balf. fil. et Forrest.

Primula capitata, G. Forrest in Notes R.B.G. Edin. ix (1908), 224.

Epilosa. Folia floribus coaetanea petiolata ad 12 cm. longa ad 2.5 cm. lata; lamina anguste oblonga vel oblanceolata mem-

branacea obtusa vel subrotundata vel subpraemorsa irregulariter eroso-denticulata in petiolum alatum alis integris lamina breviorem attenuata subtus pallidior pulverulenta plus minusve nervulosa venis primariis e costa media albida arcuatim adscendentibus. Scapus ad 30 cm. altus robustus stramineus minute puberulus apicem versus albofarinosus umbellam capituliformem sphaericam multifloram gerens; bracteae albofarinosae exteriores involucrantes foliaceae ad 1.4 cm. longae subspathulatae lamina inciso-fimbriata ad 5 mm. lata in petiolum ligulatum basi vix vaginantem et haud incrassatum cuneatim attenuata, interiores ligulatae integrae acutae; pedicelli albofarinosi ad 5 mm. longi sub fructu longiores deflexi; anthopodium obconicum flore abstrictum. Calyx albofarinosus cupula intus excepta ad 4.5 mm. longus tubo vix angulato ultra medium fissus lobis lanceolatis acutis vel acuminatis adpressis aequalibus rarissime posteriori maximo denticulato et purpureo. Corollae extus supra calycem farinosae limbus concavus atropurpureus, tubus extus rufescens ad 9 mm. longus cylindricus supra stamina ampliatus intus purpureus exannulatus supra stamina transverse rugosus infra membranaceus, limbi discus 3 mm. latus, lobi ad 3 mm. longi ad 2.5 mm. lati obcuneati vel subquadrati profunde emarginati nunc sinu apiculato. Antherae angustae connectivo purpureo in flore longistylo a basi corollae 3.5 mm. insertae apicibus ab ore 3.5 mm. remotis, in brevistylo supra calycem inserta apicibus ab ore corollino 1 mm. remotis. Ovarium depresso-globosum; stylus longus calyce longior, brevis calycem subaequans; stigma capitatum lobulatum. Capsula calycis tubo paullo aucto inclusa subturbinata vertice plano operculatim incrassato valvis crustaceis 5 dehiscens. Semina minuta plana margine cellulis aeriferis minute arillata.

Species ex affinitate *P. capitatae*, Hook. bracteis petiolatis fimbriatis, corolla exannulata intus purpurea dignoscenda; a *P. pseudocapitata*, Ward (ined.) bracteis inciso-fimbriatis diversa.

Yunnan. Open marshy places in pine woods on the ascent to Kari Pass between Pung-tzu-la and Shi-zo. Alt. 10,000–14,000 ft. Perfumed. G. Forrest. No. 46. September 1904. In Herb. Edin.

Yunnan. Western slopes of Kari Pass leading into the Chun pa Valley between Pung-tzu-la and Shi-zo. Alt. about 13,000–14,000 ft. Flowers most delicately perfumed. G. Forrest. No. 303. September 1904. In Herb. Edin.

One of the Chinese forms of the Himalayan aggregate *P. capitata*, Hook. One other Chinese form is known up to this time in *P. pseudocapitata*, Ward. Both of them, though easily recognised as nearly allied to the Himalayan forms, can

be readily distinguished by the much smaller corolla limb and the more globular head of flowers.

1716 **Primula stolonifera,** Balf. fil.

P. farinosa, Linn. ex G. Forrest in Notes Roy. Bot. Gard. Edin. iv (1908) 231.

P. pseudodenticulata, Pax ex Pl. Chinenses Forrestianae, Notes Roy. Bot. Gard. Edin. vii (1912), 84, 91.

Multiceps stolonifera epilosa. Stolones basi nudi ad 6 cm. excurrentes robusti decumbentes in axillis foliorum rosulatorum orientes. Folia floribus coaetanea ad 8 cm. longa ad 1.5 cm. lata oblanceolata vel anguste obovato-oblonga obtusa tenuiter membranacea efarinosa margine crenato-denticulata vel dentato-serrata vel subserrata deorsum in petiolum lamina breviorem alatum alis integris sensim attenuata utrinque laevis costa media subtus albida prominula. Scapus sub anthesi tenuis sub fructu auctus robustus glaber apicem versus plus minusve farinosus umbellam parvam gerens; bracteae minutae exteriores 3 mm. longae elongato-triangulares obtusae subcrassae basi plus minusve farinosae membranaceo-auriculatae infra nec incrassatae nec gibbosae, interiores minores; pedicelli 2–4 mm. longi validi plus minusve farinosi anthopodio turbinato ad 2 mm. longo flore abstricto terminati. Calyx campanulatus plus minusve farinosus 5 mm. longus ad medium fissus lobis oblongis obtusis apice saepe purpurascentibus. Corollae purpureae tubus 5 mm. longus extus plus minusve farinosus supra stamina ampliatus intus annulo luteo conspicuo instructus et transverse rugosus infra membranaceus, limbi discus 0.5 mm. latus, lobi obovati 4 mm. longi plani profunde bipartiti. Staminum filamenta brevissima antheris ovoideis 1 mm. longis in flore brevistylo prope orem tubi corollini inserta apicibus antherarum annulum attingentibus longistylo ad medium inserta apicibus antherarum ab annulo 2 mm. remotis. Ovarium globosum superne crustaceum; stylus ruber, longus staminibus vix longior, brevis calycis tubo paullo longior; stigma capitatum. Capsula calyce inclusa valvis 5–10 crustaceis dehiscens.

Species aggregatae *P. denticulatae,* Sm. stolonibus esquamatis notata.

Yunnan. Delavay. 1883–1885. In Herb. Paris.

Yunnan. Moist, open situations along the base of the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 8000–9000 ft. Plant of 4 to 12 inches. Flowers pale rose, eye orange. G. Forrest. No. 1818. April–May 1906. In Herb. Edin.

Yunnan. Moist, boggy situations by sides of streams in the Lichiang Valley, south of the city. Lat. 26° 50′ N. Alt.

8200 ft. Plant of 6 to 9 inches. Flowers pale rose-lilac, eye orange, fragrant. G. Forrest. No. 2037. May 1906. In Herb. Edin.

Yunnan. Marshy ground on the hills of La-Mey. Alt. 7350 ft. Flowers violet. E. E. Maire. March. In Herb. Edin.

No other species of the aggregate *S. denticulata*, Sm. shows the robust naked stolons of this plant.

1652 **Primula tanupoda,** Balf. fil. et W. W. Sm.

Parva farinosa pulverulenta foliis petiolatis. Folia ad 2 cm. longa; lamina subcrassiuscula anguste ovata ad 1 cm. longa ad 7 mm. lata obtusa margine subcartilaginea eroso-crenulata utrinque pulverulenta infra in petiolum laminam subaequantem attenuata. Scapus brevissimus circ. 5 mm. longus validus umbellam 4-floram gerens; bracteae ad 1 cm. longae membranaceae vaginantes rufo-glanduloso-punctatae cucullatae acuminatae basi saccato-gibbosae; pedicelli longissimi 5 cm. longi rigidi; anthopodium discoideum. Calyx ad 8 mm. longus tubulosus 5-costatus intervallis pergamentaceis subpuberulus in trientem fissus lobis elongatis triangularibus minutissime ciliatis. Corollae tubus in flore longistylo cylindricus exannulatus intus sparsim puberulus, limbi discus 2 mm. latus, lobi obovati 7 mm. longi profunde emarginati segmentis divaricatis. Stamina filamentis brevissimis antheris 2 mm. longis ad medium tubi corollini inserta calyce inclusa. Ovarium oblongum; stylus longus validus exsertus; stigma capitatum.

Ex affinitate *P. involucratae*, Wall. et *P. tibeticae*, Watt ab hac foliis, floribus majoribus, et annuli inopia, ab illa foliis pulverulentis crenulatis, scapo foliis breviore differt.

W. Himalaya, Kumaon. Ralam Valley. Inayat. No. 24,647/*b*. 18th August 1900. In Herb. Kew.

A single specimen in Mr. Duthie's herbarium now at Kew is so different from all other Indian Primulas that it is described here as a new species. At first sight it looks something like *P. involucrata*, Wall. but its leaves are farinose and are distinctly cut on the edge. The aspect of the flower is quite that of *P. involucrata*, Wall. but there is no annulus in the corolla tube. It resembles *P. sibirica*, Jacq. in the shortness of the basal sac to the bracts, which is quite unlike that of *P. involucrata*, Wall. From both of these species it is separated by the long flower pedicels arising from a scape so short as to be included in the leaf sheaths. By this it recalls *P. tibetica*, Watt and like that species it is farinose (the books erroneously refer to *P. tibetica*, Watt, as "not

mealy"). Its larger size, want of an annulus, petals not reflexing readily, distinguish it however from *P. tibetica*, Watt. It might be regarded as a North-West Himalayan representative of *P. tibetica*, Watt. On the single specimen available for examination the long pedicels of one of the flowers bears at a short distance below the flower a pair of bracts. This suggested that the specimen might be throughout abnormal and only a short-scaped variation of P. *involucrata*, Wall. or a long-pedicelled and large-flowered *P. tibetica*, Watt or even a *P. sibirica*, Jacq. modified. The chain of characters in the plant is such however that one cannot regard the suggestion as valid. One must hope for more specimens.

Primula taraxacoides, Balf. fil.

Herba glabra aspectu *Taraxaci* collo squamis membranaceis plus minusve farinosis persistentibus alabastri hiemalis vestita foliis floribusque coaetaneis. Folia ad 8 cm. longa ad 3 cm. lata membranacea lyrata pinnatifido-runcinata lobis triangularibus inciso-dentatis apice acutis basi in petiolum alatum attenuata. Scapus robustus foliis brevior sub fructu haud auctus superne saepe sparsim farinosus umbellam 8–12-floram gerens; bracteae triangulares acutae basi subgibbosae subfarinosae ad 5 mm. longae pedicellis multo breviores; pedicelli ad 1.4 cm. longi sparsim farinosi vel efarinosi. Calyx ad 5 mm. longus subpoculiformis sparsim glandulosus accrescens lobis ad 1.5 mm. longis triangularibus vel ovatis vel subrotundatis apiculatis. Corollae violaceae tubus 1 cm. longus annulatus, lobi 7 mm. longi late obovati vel rotundati retusi margine breviter dentati. Capsula globosa calyce inclusa.

A *P. sonchifolia*, Franch. ambitu foliorum, scapo foliis breviore, corolla minore differt.

Yunnan. Rocks of Ma long. Alt. 9000 ft. Leaves of Leontodon. Flowers violet. Coll. E. E. Maire. In Herb. Edin.

We have yet to learn much of the forms of and allied to *P. sonchifolia*, Franch. This plant seems to have well-marked characteristics within an aggregate of which Franchet's plant is the type.

Primula Traillii, Watt, in Journ. R.H.S. xxix (1904), p. 299.

Epilosa; rhizoma breve crassum alabastro magno albofarinoso coronatum folia magna vaginantia petiolata gerens et vestigiis foliorum anni praeteriti obtectum. Folia ad 25 cm. longa; lamina membranacea elliptica vel oblonga vel obovato-oblonga 8–14 cm. longa 3–6 cm. lata apice rotundata margine plus minusve denticulata basi gradatim in petiolum crassum laminam aequantem vel ea longiorem basi vagina longa

amplexicauli instructum attenuata, subtus dense albo-farinosa costa media prominula percursa. Scapus robustus ad 25 cm. altus plus minusve albo-farinosus umbellam pauci- vel pluri-floram solitariam gerens nunc florum verticellis 1–2 inferioribus praeditus ; bracteae inaequales exteriores ad 1.5 cm. longae lineari-lanceolatae ; pedicelli inaequales validi erecti sub anthesi ad 5 cm. longi sub fructu longiores ; anthopodium turbinatum. Calyx ad 8 mm. longus campanulatus membranaceus venulosus ultra medium fissus lobis lanceolato-acuminatis margine intusque albo-farinosis. Corollae pallide coeruleae tubus cylindricus membranaceus in flore longistylo ad 1.2 cm. longus intus puberulus annulo 10-lobato prominulo instructus, limbi discus angustus, lobi obovati integri ad 7 mm. longi. Stamina filamentis conspicuis 0.75 mm. longis antherisque 2 mm. longis in flore longistylo infra medium tubi corollini inserta ultra calycem prolongata. Ovarium pyriforme ; stylus longus exsertus ; stigma ovoideum. Capsula cylindrica rufo-brunnea crustacea 1 cm. longa calyci aucto tamen membranaceo aequilonga et eo inclusa valvis 10 ab apice deorsum plus minusve dehiscens ; placenta subcolumnaris stipitata.

Species distincta a Cl. Watt *P. sikkimensi*, Hook. collocata.

N.W. Himalaya. Kangra, Kulu. Sharran Glaciers. Alt. 16,000 ft. Watt. No. 13,495. 18th Oct. 1894. A large, handsome Primula growing in the deep shade of large rocks in rich black soil,—dry. Seedlings with rotund leaves. Adult plants about 15–20 inches in height. All the under surfaces densely coated with white farina. It appears to flower in spring and again in autumn. Inflorescence with two or three whorls of flowers borne on long pedicels. Involucre of bracts not spurred linear-lanceolate. Calyx linear-lanceolate acuminate. In Herb. Edin.

This species, named by Sir George Watt in honour of the Rev. J. Traill of Jaipur, is briefly diagnosed by him in the Journal of the Royal Horticultural Society, xxix (1904). A figure and description of *P. involucrata*, Wall. are given under the name *P. Traillii* in the Gardeners' Chronicle, xxii (1897), 263, from plants grown by Mr. George Wilson. The origin of the confusion Sir George Watt thus explains :—" The seed I collected of it [*P. Traillii*] was mixed with the only other Primula found in Kulu during that expedition, namely, *P. involucrata*, Wall. on account of the necessity that existed to economise my collecting materials. On the mixed seed reaching Europe it was found that only *P. involucrata*, Wall. germinated, and thus got talked of as *P. Traillii*, Watt." *P. Traillii*, Watt has not yet come into cultivation. The dried specimens promise a good garden plant when it does come.

Sir George Watt finds the affinity of his species in *P. sikki-*

mensis, Hook, in the group of forms within his Section Purpurea, which have petals entire or partly emarginate and the throat of the corolla exannulate. In ascribing to *P. Traillii*, Watt an exannulate corolla Sir George Watt's recollection of the plant as he found it ten years previously has not served him well or perhaps he was misled by a somewhat faulty drawing by a native artist of dissected flowers attached to his herbarium sheets. No annulus is shown in these. But I find a conspicuous ten-lobed annulus in the flowers of the dried specimens. It may be that the affinity suggested is correct, but I am not satisfied about it. The form of calyx and corolla seems different—there is the annulus—and then the placental column tends to the globular. Unfortunately the critical seeds are wanting in all the specimens.

Primula Umbrella, Forrest.

Herba parva luteo-farinosa. Folia oblonga ad 3.5 cm. longa 1.5 cm. lata in petiolum brevem latum planum cuneatim attenuata margine infra medium integra supra medium recurvata sursum eximie dentato-serrata dentibus corneo-apiculatis, subtus dense supra sparsim luteo-farinosa. Scapus 5 cm. altus folia longe superans plus minusve luteo-farinosus umbellam 6–8-floram gerens ; bracteae 5 mm. longae lanceolatae obtusae margine subinvolutae luteo-farinosae cucullatae pedicellos amplectantes ; pedicelli circa 10 cm. longi ab umbone umbellae perinde ac costae umbraculi radiatim subdependentes. Calyx 5–7 mm. longus campanulatus intus viridis dense luteo-farinosus vix ad medium fissus tubo a basi prominenter 5-costato, lobis obtusis corol.ae adpressis. Corollae lilacinae tubus 10 cm. longus extus farinosus albus vel lilacino-striatus calycem duplo superans, fauce albido-farinosa ; limbus ad 2 cm. diametiens, lobis latis obcordatis.

P. kialensi Franch. affinis bracteis cucullatis farinosis calyce costato distinguenda.

N.W. Yunnan. 1910. G. Forrest. Collected with *P. membranifolia.*

A species which appears to be a near neighbour of *P. kialensis*, Franch. *P. Umbrella*, Forrest differs from *P. kialensis*, Franch. as described in the much longer scape, obtuse bracts sheathing the pedicels, densely farinose bracts, pedicels, and calyx, costate calyx tube. This dainty species is in cultivation, but is not a rapid grower. The abundance of golden meal all over the plant is characteristic, but the most differentiating mark is found in the inflorescence. The bracts radiate from the top of the scape, each one forming a channel in which a pedicel, twice the length of the bract, lies. The calyx too is

characteristic, with its ridged short sepals. Mealiness extends to the corolla, which is dusted with it outside and at the throat.

Primula Viola-grandis, Farrer et Purdom.

Efarinosa glanduloso-hirsuta foliis longe-petiolatis rosulatis paucis primo erectis demum patulis floribus coaetaneis sub anthesi squamis erectis albidis alabastri basi cinctis. Folia ad 5 cm. longa post anthesin accrescentia; lamina sub anthesi ad 2.5 cm. longa ad 1.5 cm. lata ovato-cordata opaca crassa pallide venulosa obtusa margine integra vel obscure et late crenulata glanduloso-ciliata utrinque pilis albidis mollibus glandulosis vestita et glandulis plurimis capitatis rubris (in fol. sicc.) obtecta; petiolus lamina duplo vel triplo longior validus succulentus glanduloso-hirsutus infra in vaginam elongatam intra alabastri squamas expansus in foliis adultis vix alatus. Scapus ad 12 cm. longus foliis multo longior dense glanduloso-hirsutus infra albidus superne nigro-purpureus ebracteatus uniflorus. Flos magnus subzygomorphus. Calyx breviter cupuliformis ad 6 mm. longus fere ad basin fissus lobis ovato-lanceolatis plerumque nigro-purpureus pilisque glandulosis obsitus. Corollae violaceo-coeruleae tubus cylindricus ultra 3.5 cm. longus pallide purpureus strictus angustus orem versus gradatim expansus extus glanduloso-hirtus intus ubique glaber ad faucem ampliatus albidus, limbi plani obliqui discus purpureus ad 2 mm. latus glanduloso-puberulus, lobi plerumque 6 nunc 5 vel 7 ad 1.4 cm. longi ad 7 mm. lati aperti subspathulati vel obcuneati vel anguste oblongo-obovati basi glanduloso-ciliati emarginati segmentis integris. Stamina ut in Omphalogramma sectione filamentis purpureis longis ad 5 mm. longis robustis orem tubi corollini versus convergentibus supra medium inserta; antherae ovoideae subexsertae. Ovarium ovoideum superne conoideum stylo longo filiformi glabro albido paullo exserto terminatum; stigma parvum lobulatum.

Species *P. Engleri*, Knuth similis foliis minoribus crassiusculis longe petiolatis squamis alabastri sub anthesi cinctis, glandulis capitatis foliorum, scapo folia excedente, calyce cupuliformi, corollae fauce albida glabra lobisque angustis emarginatis haud incisis bene distincta.

Kansu. Farrer and Purdom. No. 74. 1914. In Herb. Edin.

The following is Mr. Reginald Farrer's description of the plant as he found it in Kansu :—

"Primula No. 6 *P. Viola-grandis*: Sect. Omphalogramma).

"Whole plant clothed in whitish glandular hairs. Leaves appearing with the flowers, and developing further afterwards,

springing in a tuft, about 2½–5 cm. in length, ovate-cordate, dark green, thick and flannelly, borne on stout petioles as long as the blade, and often twice as long ; the lowest diminishing till they are but small oval-rounded pale tabs. Scape 3½–5 inches, greatly exceeding the leaves, each carrying one very large flower. Calyx a cup, cloven to the base in ovate-lanceolate lobes. Flower rich light violet-blue, of luminous effect, the straight tube more than 3½ cm. in length, glandular, pale-purple, slightly and gradually swelling at base and throat. Lobes of the corolla and calyx usually 6, sometimes 5 or 7 : those of the corolla open at first in a small regular star of deep violet, but soon lighten, the three upper lobes now lying stiffly back along the tube, and the three lower standing as stiffly outward, so as to make a strangely Gesneraceous effect. Corolla lobes obovate, usually emarginate. Stamens all gathered at the roof of the tube, over the pistil. Capsule globular (?).

"Distributed locally at high elevations, Siku, Satanee, 9000–10,000, *only* in steep banks of turf-shelves sloping W. or N.W. in soil of red limy loam, rich friable forest compost, or black vegetable mould, sharply drained and loose, getting no moisture but that belonging to the high altitude, and cool exposure that it unalterably affects, haunting the underside of tussocks, but occasionally spreading even into the fine light scrub of little gale and rhododendron. May and June."

And later he says :—"This noble Omphalogramma expands fully in late summer ; *very* thick and flannelly leaves of deep dusty opaque green with lighter veins remarkably suggesting those of some fat Viola of the 'hirta-group,' but lying out on the ground, too heavy for their flushed fleshy and stalwart peduncles. The capsule is apparently round, the calyx fringed with many teeth ; the sp. with its absurd throat, is not at all a free seeder. One rocky shelf, that had been blue with blossom, yielded only some 7–8 seed-stems. Flowers May ; seed nearly all gone, Sept. 3."

Photographs of the species, with brief comment upon its beauties, have appeared in the Gardeners' Chronicle, lvi (1914), 347.

The plant is an interesting addition to the Omphalogramma series. Its nearest ally is *P. Engleri*, Knuth a species collected by Soulié at Tatsienlu. I have not seen specimens of *P. Engleri*, Knuth, and rely entirely upon the technical description as a basis for the differentiation from it of *P. Viola-grandis*, Farrer et Purdom. For purposes of comparison a transcription of Knuth's description of *P. Engleri*, Knuth is given

below.* The diagnostic characters are these:—*P. Engleri*, Knuth has thin papyraceous leaves which are rarely petiolate. Farrer and Purdom say of *P. Viola-grandis*, Farrer et Purdom that the leaves are very thick and flannelly and have fleshy stalwart stalks. The interpretation of Knuth's statement that in his plant the scape is destitute of basal scales is not quite clear. No Omphalogramma has scales on the scape, and I must assume that Knuth refers to the bud scales around the foliage leaf tuft. Such scales are distinctly present in *P. Viola-grandis*, Farrer et Purdom. Then Knuth says nothing about any capitate glands interspersed amongst the long white hairs on the leaves of his plant. In *P. Viola-grandis* Farrer et Purdom these are abundant and so evident that no careful describer could miss seeing them. In the dried specimens they are bright red; whether that is the colour in the living leaf I do not know. The scape of *P. Viola-grandis*, Farrer et Purdom is much longer than the leaves. In Knuth's plant the scape is described as only slightly longer than the leaves. Knuth says of *P. Engleri*, Knuth that the calyx is widely campanulate. That hardly fits *P. Viola-grandis*, Farrer et Purdom where the calyx tube is a shallow cup. Lastly, in the corolla—the throat in *P. Engleri*, Knuth is said to be densely puberulous with short hairs—its colour is not mentioned; in *P. Viola-grandis*, Farrer et Purdom the throat is hairless and is whitish. The corolla lobes of *P. Engleri*, Knuth are broadly obovate and retuse slightly incised. In *P. Viola-grandis*, Farrer et Purdom they are narrowly obovate or spathulate and are emarginate with entire segments. The sum of characters suffices to justify the naming of Mr. Farrer's plant as a new species, and its area, it will be noted, is some distance from that of *P. Engleri*, Knuth.

Mr. W. W. Smith, who has a first-hand knowledge of the

* "*Primula Engleri*, R. Knuth, in Botanische Jahrbücher, xxxviii, (1907) 340.

"Parce pubescens pilis mollibus hyalinis, albidis vel lutescenti-albidis. Foliorum lamina 3–5 cm. longa, usque 2 cm. lata, oblongo-ovata, basi rotundata, rarius in petiolum ± abrupte attenuata, tenuiter papyracea, apice rotundata, integra; petiolus quam lamina 2–3-plo longior, alatus, 6–9 cm. longus, in sicc. 2–4 mm. latus, pilis articulatis pubescens. Scapus cum foliis coaetaneus, ebracteatus, uniflorus, pubescens, squamis basilibus plane destitutus, cum flore folia paullo superans, non raro aequans. Calycis late campanulati, profunde partiti laciniae 5 mm. longae, oblongo-lanceolatae, obtusiusculae, integrae, glandulis stipitatis satis dense obsitae. Corollae tubus extus pilosulus, intus glaber, 25 mm. longus, quam calyx circ. 5-plo longior, infundibuliformis, partibus inferiore et media aequilatus, parte summa satis abrupte in limbum ampliatus; faux pilis brevibus dense puberula; lobi purpurei, late obovati, apice retusa leviter incisi. Stylus filiformis, corollae tubum vix superans, glaber.

"Ost-Tibet: Ta-tsien-lu (Soulié a. 1894, n. 2237). Typus in Herb. Berol.!

"Species certe ad sectionem *Omphalogramma* pertinens, differt scapo squamis destituto a *P. vinciflora* et *P. Elwesiana* et *P. Delavayi*. Corollae longitudine et latitudine autem facile distinguitur a *P. Franchetii*."

Omphalogrammas in *P. Elwesiana*, King, in Sikkim, to whom I have shown the specimens, concurs in the view expressed of the relationship of *P. Viola-grandis*, Farrer et Purdom and *P. Engleri*, Knuth.

Farrer and Purdom's plant has some resemblance to *P. vincaeflora*, Franch. but is altogether less robust, and the long petioled leaves separate them at sight.

Franchet first pointed out the distinctness of these forms from Primula, and definitely in 1898 * he constituted the genus Omphalogramma for them, having previously in 1885 † been content to place them as a section under Primula. Pax in 1889 ‡ kept up Franchet's group as a section of Primula, renaming it Barbatae on the trivial ground that, as seed was known in only one of the three species recognised at the time, the name might not be descriptively accurate of the others. In his monograph of 1905 § Pax reverts to Franchet's name Omphalogramma, but keeps the group as a section of Primula notwithstanding Franchet's advocacy in his paper of 1898 of its claim to generic rank.

I have had opportunity to examine specimens of all of the known species excepting *P. Engleri*, Knuth. The labours of Forrest and Ward in China and of Cave and Cooper in Sikkim have furnished an ample supply of dried specimens, and through Forrest and Cave we have now living plants in the Royal Botanic Garden, Edinburgh, of *P. Delavayi*, Franch., *P. Elwesiana*, King, *P. Franchetii*, Pax, and *P. vincaeflora*, Franch. *P. Franchetii*, Pax in fruit is still unknown in Europe. The more I examine the plants, the more convinced I am that Franchet is right in treating Omphalogramma as a genus separate from Primula. I do not lay stress upon vegetative features—their general characters occur in true Primulas, for instance, in *P. Gammieana*, King, in *P. Gambeliana*, Watt and others of the so-called Cordifolia section. The flower and seed characters give quite definite diagnostic marks of generic value, and these are :—

(*a*) The flower is zygomorphous.

(*b*) The numerical symmetry of perianth and androecium—the whorls have commonly six parts, but may be up to eight, and occasionally five.

(*c*) The stamens have long stout filaments with the anterior ones bending across the corolla tube to complete the cone of anthers at the corolla mouth.

(*d*) Seeds flat with a broad wing-aril.

* Franchet in Bull. Soc. Bot. Fr. xlv (1898), 179.
† Ibid., xxxii (1885), 272.
‡ Pax in Engl. Jahrb. x (1889), 209.
§ Pax, Primul in Engler's Pflanzenr, (1905), 109.

The differences from Primula are much greater than some of those which separate other genera from it—take, for instance, Androsace or Cortusa.

The genus of Primulaceae to which Omphalogramma shows most resemblance is the monotypic Bryocarpum which in its species, the yellow-flowered *B. himalaicum*, Hook. f. et Thoms. is a well known Sikkim plant and is now in cultivation. The whole facies of Bryocarpum is that of Omphalogramma—the petiolate ovate leaves arising within a sheath of scales, the long ebracteate scape with one large terminal oblique flower, the numerical symmetry of the flower, 5–8 parts in the whorls, the calyx cut into narrow segments to the base, the long corolla tube and lobes. Its differences are the less hirsute covering, the stamens with short filaments and longer acuminate anthers, the long cylindric capsule many times the length of the calyx and opening by a stylopodial lid beneath which are found some short valves—in Omphalogramma it is always short ovoid with the upper quarter extruding from the calyx and dehiscing from the style base right down often to the base,—lastly, the oblong ellipsoid seeds with areolate surface. A subordinate character : the ovary of *Bryocarpum himalaicum*, Hook. f. et Thoms. has a sparse coating of red capitate glands. I have seen nothing of this in Omphalogramma. Those who wish to sink Omphalogramma would place it more conveniently in Bryocarpum than in Primula.

Were I to write a monograph of Primula I should exclude Omphalogramma. As I am not doing so, I add here the names of the plants that are involved in this Primula-Omphalogramma discussion, giving them their specific designation under both genera :—

Primula Elwesiana, King (1882) =*Omphalogramma Elwesiana* (King), Franch. (1898).

Primula Delavayi, Franch. (1885) =*Omphalogramma Delavayi*, Franch. (1898).

Primula vincaeflora, Franch. (1887) =*Omphalogramma vincaeflora*, Franch. (1898).

Primula Franchetii, Pax (1905) =*Omphalogramma Souliei*, Franch. (1898).

Primula Engleri, Knuth (1907) =*Omphalogramma Engleri* (Knuth), Balf. fil. (1915).

Primula Viola-grandis, Farrer et Purdom (1915 =*Omphalogramma Viola-grandis*, Farrer et Purdom (1915).

Primula Waddellii, Balf. fil. et W. W. Sm.

Pusilla caespitosa efarinosa epilosa. Folia circa 1 cm. longa spathulata crassa ; lamina ad 3 mm. lata apice rotundata margine

crenulata nunc denticulata. Scapus brevissimus 1.5 mm. longus puberulus uniflorus; bractea singula minuta subulata subcalycina; pedicellus sub-nullus. Calyx 5 mm. longus anguste poculiformis puberulus lobis a basi lanceolatis acutis. Corollae tubus 1 cm. longus fauce exannulata granulosa, lobi obovati 6 mm. longi subcrassiusculi profunde bifidi. Stamina floris longistyli ad medium tubi corollini inserta. Stylus brevis vix 1 mm. longus.

Ex affinitate *P. Stirtonianae,* Watt foliis spathulatis crassis crenulatis nonnunquam dentatis apice rotundatis, flore solitario sessili, scapo puberulo brevissimo 1.5 mm. longo bracteam parvam unam subulatam subcalycinam gerente, calyce puberulo 5 mm. longo fere ad basin fisso divergens.

Tibetan Plateau, N.W. of Tangla. Alt. 15,000 ft. Waddell. No. 34. June 1891. In Herb. Calc.

Tibet, N.W. Chumbi below Ghora La. Alt. 15,000 ft. Waddell. No. 78. June 1891. In Herb. Calc.

The material of this plant in the Calcutta Herbarium is scanty, but suffices to indicate that the plant has not yet been described.

The plant has in some ways a resemblance with *P. Stirtoniana,* Watt but its foliage is not the same. The leaves are truly spathulate, and have a crenulate margin which is, however, sometimes dentate, but the leaf has never the obcuneate form and somewhat truncate apex of that of *P. Stirtoniana,* Watt. The nearly sessile flower and small subulate bract just below the calyx are also different from what is found in *P. Stirtoniana,* Watt and the calyx is much smaller, as is the whole flower. It may be, however, that this is a microform of *P. Stirtoniana,* Watt.

Primula Waltoni, Watt ex scheda in Herb. Calc.

Elata luteo-farinosa epilosa foliis paucis petiolatis. Folia ad 30 cm. longa; lamina oblonga ad 20 cm. longa ad 7 cm. lata membranacea rugosa obtusa margine sinuata eroso-dentata basi petiolo vix alato ad 6 cm. longo instructa costa media prominula venis primariis patulis percursa venuloso-reticulata subtus plus minusve luteo-farinosa utrinque glanduloso-foveolata. Scapus ad 7 dm. altus sub fructu altior robustus plus minusve luteo-farinosus umbellam magnam plurifloram gerens; bracteae inaequales exteriores ad 1.5 cm. longae a basi 3 mm. lata sursum in setam terminalem attenuatae luteo-farinosae basi subtus plus minusve pulvinatim incrassatae; pedicelli inaequales ad 10 cm. longi validi flexiles plus minusve luteo-farinosi; anthopodium obconoideum conspicuum. Calyx ad 7 mm. longus poculiformis 5-costatus extus dense luteo-farinosus ad trientem fissus lobis elongato-triangularibus acutis basi

subinflatis apice reflexis intus dense luteo-farinosis. Corollae violaceae tubus in flore brevistylo ad 1 cm. longus cylindricus supra stamina ampliatus in longistylo brevior intus paullo transverse rugosus exannulatus fauce puberulus, limbi discus concavus 3 mm. latus, lobi breves ad 4 mm. longi obcordati leviter emarginati. Stamina filamentis brevibus antherisque 2 mm. longis in flore longistylo basin tubi corollini versus ovarium juxta inserta calycis tubo inclusa, in flore brevistylo fere exserta. Ovarium oblongum in dimidio superiore incrassatum; stylus longus exsertus, brevis calycis tubum vix superans; stigma globosum. Capsula cylindrica ad 1 cm. longa ultra calycem auctum crustaceum quadrante projecta ab vertice valvis 5 crustaceis brevibus brunneis ad apicem sepalorum dehiscens; placenta cylindrica; semina nigro-brunnea saponis aspectu oblonga ad 1.5 mm. longa angulata; testa fere laevis.

Species foliorum inflorescentiae seminisque aspectu *P. sikkimensi*, Hook. persimilis sed corollae calycisque forma longe recedit.

Tibet. Hills above Lhasa. Walton. Aug. 1904. In Herb. Calc.

A fine species, to which Sir George Watt has attached this name in the Calcutta Herbarium, but without publishing a description, and it is not mentioned in his Observations on Indian Primulas in the Journal of the Royal Horticultural Society, xxix (1904), 295. Its position is, I think, in the Sikkimensis series, where it is one of the exceptional lilac-flowered Indian species. There are two sheets of it only in the Calcutta Herbarium. Collectors should search for it.

1648. **Primula Wardii**, Balf. fil.

P. sibirica, Jacq. var. *chinensis*, Hort. Veitch.

Paludicola caespitosa efarinosa epilosa. Folia petiolata ad 4 cm. longa; lamina oblonga ad 1–4 cm. longa (rarissime 6) ad 1.5 cm. lata obtusa integerrima vel obscure denticulata basi in petiolum anguste alatum longe vaginantem laminam aequantem vel ea duplo-longiorem breviter attenuata subcrassiuscula glaberrima. Scapus validus ad 25 cm. altus glaber umbellam 2–10-floram gerens; bracteae foliaceae involucrantes cucullatae ad 1.5 cm. longae ad 5 mm. latae plurinerviae costa media prominula hydathodo immerso conspicuo terminatae basi in appendiculam oblongam bracteae ipsi fere aequilatam et ea dimidio breviorem obtusam rotundatam vel truncatam adpressam vel leviter divaricatam; pedicelli ad 2 cm. longi obscure glandulosi plus minusve nutantes; anthopodium discoideum 5-lobatum. Calyx ad 1 cm. longus corollae tubo brevior tubulosus 5-angulatus intervallis per-

gamentaceis obscure glanduloso-punctatus ad trientem fissus lobis triangularibus obtusis margine ciliatis. Corollae roseae vel violaceae tubus cylindricus supra stamina ampliatus in flore brevistylo ad 1.4 cm. longus in flore longistylo brevior membranaceus leviter rugosus luteo-annulatus annulo 10-lobato lobis per paria antipetalis, limbi plani discus 1.5 mm. latus, lobi obovati profunde et late bifidi subcrenulati. Stamina filamentis brevissimis et antheris magnis ad 3 mm. longis in flore brevistylo ad orem tubi corollini antheris semiexsertis in flore longistylo infra medium antheris calyce inclusis inserta. Ovarium ovoideum dimidio supremo incrassato; stylus brevis robustus tubo calycis brevior, longus vix exsertus; stigma discoideum.

Species *P. sibiricae*, Jacq. et *P. involucratae*, Wall. affinis ab illa umbella pluriflora bractearum appendice longa, ab hac floribus roseis vel violaceis distincta.

Szechwan. Tatsienlu. 9500–11,000 ft. Pratt. No. 657. In Herb. Brit. Mus.

W. China. 11,000–12,500 ft. Marshes. Wilson. No. 4032. July 1903. In Herb. Brit. Mus.

N.W. Yunnan. A-tun-tsu. 12,000 ft. F. Kingdon Ward. No. 96. July 1911. Though growing amongst two species badly attacked by fungus, this Primula (with mauve flowers) is not attacked. Grows in damp meadow land. Only found in one locality. In Herb. Edin.

Central Szechwan. Tungngolo. Soulié. No. 1120. 1893. In Herb. Kew.

N.W. Yunnan. Marsh near A-tun-tsu. 13,000 ft. F. Kingdon Ward. No. 777. 12th July 1913. In Herb. Edin.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. 12,000 ft. G. Forrest. No. 10.344. July 1913. Plant of 6–15 inches. Flowers blue-eye greenish-yellow. Fragrant. Stony moist pastures. In Herb. Edin.

Pratt appears to have been the first collector to send home specimens of this plant. It was found later by Wilson and raised from the seed he collected by Veitch, who introduced it to horticulture under the name *P. sibirica*, Jacq. var. *chinensis*. It is a great acquisition, one of the freest of growers and seeders, and it is most floriferous.

Its nearest ally is the widespread Himalayan *P. involucrata*, Wall. which has, however, white flowers, and is thus easily diagnosed. From true *P. sibirica*, Jacq. both *P. Wardii*, Balf. fil. and *P. involucrata*, Wall. are readily distinguished by the long appendages to the bracts—these may be almost as long as the bracts. Were we to accept the most recent technical description of *P. sibirica*, Jacq. as given by Pax, we should find a diagnostic character from *P. sibirica*, Jacq. in the large 10-lobed

annulus of *P. Wardii*, Balf. fil. *P. sibirica*, Jacq. is said to be exannulate. But I do not assent to this statement. I am not yet prepared to deal with *P. sibirica*, Jacq. as an aggregate type, because I have not yet had opportunity of seeing the Petrograd collection in which it must be particularly well represented. But I have dissected the flower of the true *P. sibirica*, Jacq. in such representative specimens as a Dahurian specimen collected by Losnin and in No. 883 of Roskevitz presented to Edinburgh by the Petrograd Herbarium, as well as in Karo's No. 54 from Dahuria (one of the types of *P. sibirica*, Jacq. var. *brevicalyx*, Trautv. cited by Pax). In all of them I find an excellent annulus. I also find the annulus in European specimens—in that, for instance, collected by Hojman and included in Baenitz Herb. Europ., and also in Magnier's No. 2558 from Uleaborg, which Pax cites as his var. *integrifolia*, Pax of *P. sibirica*, Jacq. In Sir Joseph Hooker's plant from West Tibet, now in Kew Herbarium, the annulus is beautifully developed, although the Flora of Brit. India, iii (1882), 487, says the corolla is "not annulate." All this shows that a critical study of the micro-forms of the aggregate *P. sibirica*, Jacq. has yet to be undertaken.

P. Wardii, Balf. fil. is the West Chinese form of the aggregate, and is altogether a different plant from the Himalayan *P. involucrata*, Wall. These two in turn are not the same as the *P. sibirica*, Jacq., of the Flora of Brit. Ind., whatever that may be—it is not the North Siberian form of the species. True *P. sibirica*, Jacq. does not occur in the Himalayas, and the Himalayan plants so named will have to be described under a definite name.

I may add also that a number of Tibetan plants have been wrongly assigned to *P. sibirica*, Jacq. and another series of Tibetan forms has been named in herbaria *P. tibetica*, Watt, var. *intermedia*—being regarded as a passage between *P. tibetica*, Watt and *P. sibirica*, Jacq. But *P. tibetica*, Watt does not run into *P. sibirica*, Jacq. The former is not a dwarf state of the latter. *P. tibetica*, Watt is apparently a widely distributed plant in Tibet, and shows remarkable variations in stature, umbels, calyx, and corolla. Some of these are so marked in the dried specimens that it appears to be probable that more knowledge of the living plants and their relations will warrant segregation of forms within the type. As we know it at the present moment *P. tibetica*, Watt—if phyletically more nearly associated with the aggregate *P. sibirica*, Jacq. than with other species,—is a species easily diagnosed from *P. sibirica*, Jacq. by obvious characters, of which I have found the following never to fail, whether in herbarium specimens or living plants :—As anthesis proceeds the petals gradually reflex and become finally adpressed to the

side of the calyx, the consequence being that the long style, projected here far beyond the mouth of the corolla tube, stands up like a pin rising from the calyx, and in the short-styled flower the half-exserted anthers form a projecting fringe around the corolla tube mouth. This is most characteristic. In *P. sibirica*, Jacq. so far as I have seen it, the corolla lobes crumple up at the end of the tube without reflexing, and there is but slight protrusion of the style. There are other features of the bracts and the inflorescence which I think will prove to be additionally diagnostic, but it is too soon to write of them with conviction.

Primula Woodwardii, Balf. fil.

Efarinosa minutissime glanduloso-puberula rhizomate brevi. Folia at 8 cm. longa ad 1.5 cm. lata crassiuscula subtaeniaeformia obtusa vel subacuta margine subrevoluta subintegra vel irregulariter crenulata ciliata supra pallide viridia puberula subtus albida cellulis aeriferis obtecta costa media prominula percursa deorsum in petiolum alatum rubrum basi vaginantem paullo attenuata. Scapus robustus ad 20 cm. altus superne dense minute glanduloso-puberulus umbellam ad 10-floram gerens; bracteae breves ad 6 mm. longae lineari-lanceolatae acutae vel acuminatae extus glabrae virides vel purpureo-punctatae intus virides dense puberulae in pulvinum circularem involucrantem ad basin concrescentes; pedicelli validi ad 2 cm. longi bracteis multo longiores erecti virides dense glanduloso-puberuli; anthopodium obconoideum conspicuum. Calyx nigro-purpureus breviter tubulosus ad 8 mm. longus ultra medium fissus tubo extus glabro obscure angulato lobis oblongis obtusis vel subacutis adpressis ciliatis extus glabris vel sparsim puberulis intus viridibus. Corollae tubus in flore brevistylo ad 1.4 cm. longus calycem duplo superans infra cylindricus et grosse transverse rugosus ibique extus erubescens glaber supra ampliatus nigro-purpureus et glanduloso-puberulus intus infra stamina nitidus glaber viridis supra stamina nigro-purpureus glanduloso-puberulus, faux annulo puberulo viridi conspicuo 10-lobato lobis deltoideis antipetalis majoribus constricta, limbi plani discus circ. 1 mm. latus pallidus, lobi oblongo-ovati integri ad 1 cm. longi ad 8 mm. lati intense cyaneo-purpurei ubique glanduloso-puberuli subreflexi. Stamina in flore brevistylo medium tubi corollini versus et supra calycem inserta filamentis viridibus conspicuis deorsum expansis connectivo stramineo antherarum apicibus ab annulo circ. 4 mm. remotis. Ovarium ovoideum; stylus brevis viridis calyce brevior; stigma magnum depressum viride lobulato-capitatum.

Species sectionis Nivalis *P. purpureae*, Royle, subsimilis sed efarinosa et glanduloso-puberula.

N.W. China. Kansu, in Northern Peling. Alt. 10,000–12,000 ft. Fenwick Owen. Raised from seed in April 1914 by R. W. Woodward, jun., Esq., of Arley Castle.

Mr. Woodward has been so kind as to present a living seedling plant of this species to the Royal Botanic Garden, Edinburgh. It has lived through the critical seasonal period of Primula life, and we may hope therefore to learn more of it when it flowers in another season.

At the Primula Conference in 1913 I gave some rough statistics for the purpose of showing the rapid increase during preceding years in the number of known species of Primula, and I predicted even more rapid addition in the near future. The fifty new species described in these pages fulfil the prediction, and I may add that descriptions of as many more will appear in early forthcoming numbers of these "Notes." Most of the species here published we owe to recent exploration of N.W. China by Forrest, Kingdon Ward, Farrer, and Purdom, and of Eastern Himalaya by Cooper; but a considerable number are an outcome of revision of the rich material gathered by previous collectors and now preserved in the public Herbaria at Kew, Calcutta, and Edinburgh. I have to thank the Director of Kew for the facilities I have had for examining the Kew collections. To Major Gage, Director of the Royal Botanic Garden, Calcutta, I am particularly indebted for his kindness in lending me for examination the unique series of specimens of Indian species belonging to the Calcutta Herbarium. Mr. W. W. Smith's co-operation has brought to the diagnosis of Indian species his great knowledge of Indian Primulas derived from observation of the species in the field, and to Mr. W. G. Craib of Kew I am no less indebted for help and criticism.

Beesia.

A New Genus of Ranunculaceae from Burma and Yunnan.

BY

PROFESSOR BAYLEY BALFOUR, F.R.S.,

AND

W. W. SMITH, M.A.

With Plate CXLVIII.

Beesia, Balf. fil. et W. W. Sm. Genus novum Ranunculacearum.

Genus ex affinitate *Glaucidii* et *Hydrastidis*; foliis omnibus radicalibus cordatis crenatis nec partitis nec lobatis, floribus racemosis nec solitariis, carpellis solitariis distinguendum.

Herba mediocris rhizomate sympodiali. Folia plura, omnia radicalia longe petiolata alte cordata. Inflorescentia racemosa scapo longo nudo suffulta. Involucrum 0. Bracteae bracteolaeque filiformes. Sepala 4–5, inconspicua alba. Petala 0. Stamina 20–25 filamentis erectis longiusculis antheris minimis. Carpellum solitarium receptaculo parvo insertum pluriovulatum ovulis biseriatis suturae ventrali affixis. Fructus oligospermus maturitate folliculatim dehiscens. Semina ovoidea testa rugosula. Species unica in Burma septentrionali finibus chinensibus proxima atque in provincia chinensi Yunnan crescens.

4221 **Beesia cordata,** Balf. fil. et W. W. Sm. Sp. nov.

Planta herbacea cum inflorescentia circ. 30–40 cm. alta; rhizoma longum sat crassum radicibus fibrosis numerosis praeditum apicem versus squamis paucis ovatis vel lanceolatis 1–2.5 cm. longis membranaceis cinctum. Folia 3–5, petiolo 15–20 cm. longo basi paulo dilatato glabro praedita; lamina 9–16 cm. longa, 6–16 cm. lata, cordiformis vel reniformis apice ± acuminata vel rotundata basi altius cordata lobis rotundatis approximatis vel ± remotis, margine regulariter latiuscule crenata crenaturis medio indurato-apiculatis, in sicco tenuiter membranacea, utrinque glabra, supra viridis subtus pallidior nervis 5–7 basi arcuatim divergentibus. Scapus solitarius usque ad 40 cm. altus erectus nudus gracilis infra glaber supra minute

dense pubescens. Inflorescentia 10–20 cm. longa racemosa simplex vel saepius basi ramosa 10–30-flora minute fulvo-pubescens; flores singulatim vel 2–4 in cymas brevissime pedunculatas dispositi, pedicellis 5–10 mm. longis suffulti, bractea 3–8 mm. longa bracteolisque circ. 3 mm. longis filiformibus apice glandulosis praediti. Sepala 4–5, aestivatione imbricata patentia circ. 4–5 mm. longa medio 2–3 mm. lata ovato-lanceolata apiculata basi late cuneata exunguiculata glabra alba. Petala 0. Stamina 20–25 erecta calycem aequantia filamentis gracillimis 4–5 mm. longis antheris minimis 0.5 mm. longis rimis lateralibus dehiscentibus. Carpellum solitarium 4–5 mm. longum erga basin minute pubescens, forma simili gruis capiti; stylus circ. 2 mm. longus rectus vel paululo deflexus, stigmate truncatulo; ovula 8–10 biseriata suturae ventrali affixa. Folliculus fere maturus circ. 8 mm. longus (stylo persistente excluso) ab apice dehiscens membranaceus venis 6–8 oblique transversis notatus. Semina 4 vel plura ± 1.5 mm. longa ovoidea brunnea rugis oblique transversis, collari minimo lobatulo circa hilum praedita.

"Northern Burma: below Feng-shui-ling Camp, near Chino-Burmese frontier. Amongst undergrowth of rain-forest in deep shade, wet clayey soil at 9000 ft. altitude. Flowers white. June 1914." F. Kingdon Ward. No. 1660.

"Yunnan, West China. Plant of 18–20 inches. Flowers creamy white. Open moist pasture on the margins of thickets on the Kari Pass, Mekong-Yangtze divide. Lat. 27° 40′ N. Alt. 9000–10,000 ft. Aug. 1914." G. Forrest. No. 12,955.

This new genus is akin to the Japanese genus *Glaucidium* and to the Japanese and American *Hydrastis*. It differs in the leaves being all radical, cordate in shape with very regular crenations but without lobing, in the racemose inflorescence, and the solitary carpels. The generic name is formed from the title of the horticultural firm Bees, Ltd., whose enterprise in the botanical exploration of China, Burma, and the Himalayas is well known.

EXPLANATION OF PLATE CXLVIII.

Illustrating Professor Bayley Balfour and Mr. W. W. Smith's paper on Beesia.

(The plate is taken from a photograph by Mr. Robert M. Adam.)

PLATE CXLVIII.—Beesia cordata, Balf. fil. et W. W. Sm.

BEESIA CORDATA, BALF. FIL. ET W. W. SM.

The Two Rust Diseases of the Spruce.

BY

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With Plate CXLIX.

Chrysomyxa Rhododendri, De Bary. The Spruce Blister Rust, Rust of Rhododendrons.

Chrysomyxa Rhododendri was first recorded in Britain by D. A. Boyd in June 1913, who discovered the uredospore and teleutospore stages on *Rhododendron hirsutum* at Douglas Castle, Lanarkshire.

Shortly afterwards, in October 1913, material of the aecidial stage of the fungus on *Picea excelsa* was sent for identification to one of the writers from the south-west of Scotland, and its discovery was recorded in the Proceedings of the Botanical Society of Edinburgh in June 1914.*

The life-history of this species was first described in 1879 by De Bary,† who showed that the forms previously known as *Aecidium abietinum* and *Uredo Rhododendri* were stages in the development of one species to which he assigned the present name.

This species is found frequently in the Alps wherever the Alpine Rose (*Rhododendron hirsutum* and *R. ferrugineum*) occurs. The yellow clusters of uredospores are developed in September on the lower surface of the leaves and also on the bark of the

* Proc. Bot. Soc. Edinburgh, vol. xxvi, 1913–14, p. xxxiii.

† Bot. Zeit., Bd. xxxvii, 1879, p. 761.

shoots of the previous year. The uredospores are oval in form and are produced in chains; they may further propagate the disease on the Rhododendron. Slightly later the development of the teleutospores commences, and in the following spring the sori appear as small dark red cushions on the lower surface of the leaf.

The teleutospores are formed closely together in groups covered by the epidermis, and each spore consists of a series of superimposed cells. A section of a mature sorus is shown in fig. 1. Immediately before germination the epidermis is ruptured and the terminal cell of the teleutospore, the only one capable of germination, gives rise to a four-celled promycelium, each cell of which produces a sporidium. The sporidia are set free in June, and if they alight on the young leaves of the spruce may cause infection. A well-developed mycelium is produced in the leaf, and the infected area becomes yellow in colour. In some cases almost the whole of the leaf is infected, but generally the fungus is confined to certain zones and the remaining portions retain their normal green colour. As a result of infection small yellow spermagonia are first produced, and these are soon followed by the aecidia. Each aecidial sorus is surrounded by a long white pseudoperidium which, in the early stages, completely encloses the spores. The aecidiospores are arranged in chains and are produced from the base of the aecidium; they are orange-yellow in colour. At maturity the pseudoperidium breaks down at its apex and allows the aecidiospores to escape as a powdery orange-yellow mass. Before dehiscence the pseudoperidium has the form of a cylinder terminated by a rounded cone and possesses a yellow tint due to the colour of the enclosed spores. After the spores are shed the form is that of an open cylinder and the pseudoperidium is perfectly white. The aecidiospores are distributed by the wind, and if they alight on the leaves of the Rhododendron are capable of producing infection.

The material of the aecidial stage of the fungus was obtained in October, some time after its maturity and the greater part of the spores had already been shed. An examination showed that in addition to the aecidia small yellow spermagonia are present. The number of aecidia present on a leaf varies.

Fig. 2 is from a photograph of a leaf bearing two pseudoperidia; several other aecidia were present, but the pseudoperidia surrounding them had fallen away. The pseudoperidium consists of a single layer of thick-walled pitted cells with strongly verrucose walls (see fig. 3, in which the upper cells are shown in surface view and the lower in optical section). The aecidiospores are subglobose or ellipsoid, usually with a somewhat

flattened side, 20–24 × 20–23 μ in size. The wall is strongly verrucose and pitted except at the flattened portion; fig. 4 shows a spore in surface view, and fig. 5 one in optical section. The peculiar flattening of the aecidiospore depends on its method of development. A number of rows of cells are produced in the young aecidium, and in each row only every alternate cell gives rise to a spore. The intermediate cells which do not produce spores remain thin-walled and at maturity become gelatinous and almost disappear. The flattened part of the wall of the aecidiospore is the portion which was originally in contact with the intermediate cell below it, and, in some cases, the shrivelled remains of this cell are still attached and may be seen as a black line when the aecidiospore is seen in optical section (fig. 5).

In districts where the spruce does not occur it is probable that the fungus may exist through the winter in the form of hibernating uredospores, which, in the following spring, can infect the Rhododendron; it appears therefore that the presence of the spruce is not essential to the continued existence of the fungus. The aecidial stage on the spruce, however, can only exist where the Rhododendron is present, as the infection of the needles is only brought about by the sporidia. Since this is the case, the removal of the Rhododendron will completely check the disease.

It appears, therefore, that the spread of the disease on the spruce will be limited in this country since *Rhododendron hirsutum* and *R. ferrugineum*, although frequent in parks and gardens, are not usually grown in plantations. The fungus has been found on *R. dahuricum*, but does not attack *R. ponticum*, *R. catawbiense*, and their hybrids which are so commonly grown.

The effect of the disease on the Rhododendron is not serious; on the spruce the diseased needles fall in the summer of infection, and in severe cases the trees may be almost stripped of foliage.

Chrysomyxa abietis, Wallr. The Needle Rust of the Spruce.

Chrysomyxa abietis was first recorded in Scotland by Somerville,* from Durris near Aberdeen, and, writing in January 1915,† the same investigator stated that up to that time he had received no further reports of its occurrence. A quantity of the fungus was recently obtained from Aberdeenshire, and in view of the omission of this species from recent works on British Uredineae as well as its importance as a disease of the spruce, further inquiries as to its distribution in Scotland have been made.

* Quart. Journ. Forestry, vol. v, 1911, p. 277.
† Quart. Journ. Forestry, vol. ix, 1915, p. 68.

Professor Trail has kindly forwarded the following information:—

"It is not more than six or seven years ago that I first observed *Chrysomyxa abietis* in Aberdeenshire, and it is probable that the fungus has only recently made its appearance in the north of Scotland. I have seen trees attacked by the disease in the Monymusk and Farland districts. The disease is now also very common in the spruce woods on the banks of the Findhorn, where it was first noted some three or four years ago by Mr. William Watt, Assistant Forester on the Moray estates. When the infected trees in this locality are standing singly and foliaged to the ground, only the leaves on the lower branches are as yet attacked."

Mr. P. Leslie, Lecturer in Forestry at the North of Scotland College of Agriculture, informs us that *Chrysomyxa abietis* is stated to be quite common on the Novar estate, Ross-shire. It is evident, therefore, that the disease is spreading to a considerable extent.

Chrysomyxa abietis, which is widely spread in Switzerland and Germany, is an autoecious species completing its life-history on the spruce. It differs from *C. Rhododendri* in producing only one kind of spore, the teleutospore. The hibernating teleutospores germinate about May and produce sporidia which infect the young leaves of the spruce. An abundant intercellular mycelium is developed in the tissue of the leaf which sends haustoria into the cell cavities. The hyphae contain numerous yellow oil-drops, and in consequence yellow bands appear on the leaf. Soon afterwards teleuto-sori are produced which take the form of elongated yellow cushions on both the under surfaces of the leaf (fig. 6). During the winter the sori are covered, but in the following spring the epidermis is ruptured and the teleutospores project as an orange-yellow mass (fig. 7). Each teleutospore is cylindrical and consists of 8–12 superposed cells of which only the terminal one produces a promycelium (fig. 8). At about the middle of May the sorus becomes brighter yellow and the promycelia grow out. Each produces four small spherical sporidia, which become easily detached and are distributed by the wind. When the sporidia have been shed, the sorus loses its bright colour and shortly afterwards the diseased leaf falls. On coming into contact with the young needles of the spruce the sporidium produces a germ tube which bores through the epidermis and so brings about infection.

It frequently happens that certain spruces in a wood remain free from the disease, while others are badly attacked. This may be explained by the fact that infection of the young leaves only takes place at a certain stage in their development; trees

which are in a backward condition when the sporidia are ripe are not infected, while at the same time others may have passed the susceptible stage and thus escape the disease.

As a result of the attack the infected leaves die and fall from the tree, and thus a considerable defoliation may take place. The disease, however, usually fails to maintain itself through a long series of years on any one tree and in consequence felling is not desirable.

In the last issue of the Quarterly Journal of Forestry,* which we have just received on going to press, Dr. Somerville states that on April 21st specimens of spruce branches badly attacked by *Chrysomyxa abietis* were sent to him by Mr. Neil MacGregor, Bridge of Dye, Banchory, Kincardineshire. The specimens were from trees about twenty years old which were planted under old larch and Scots pine, and were situated about seven miles from the nearest part of the Durris Woods, in which Dr. Somerville discovered the disease in 1911.

We desire to thank Professor Trail and Mr. P. Leslie, M.A., B.Sc., who have kindly supplied information as to the distribution of *Chrysomyxa abietis*.

* Quart. Journ. Forestry, ix (1915), 253.

EXPLANATION OF PLATE CXLIX.

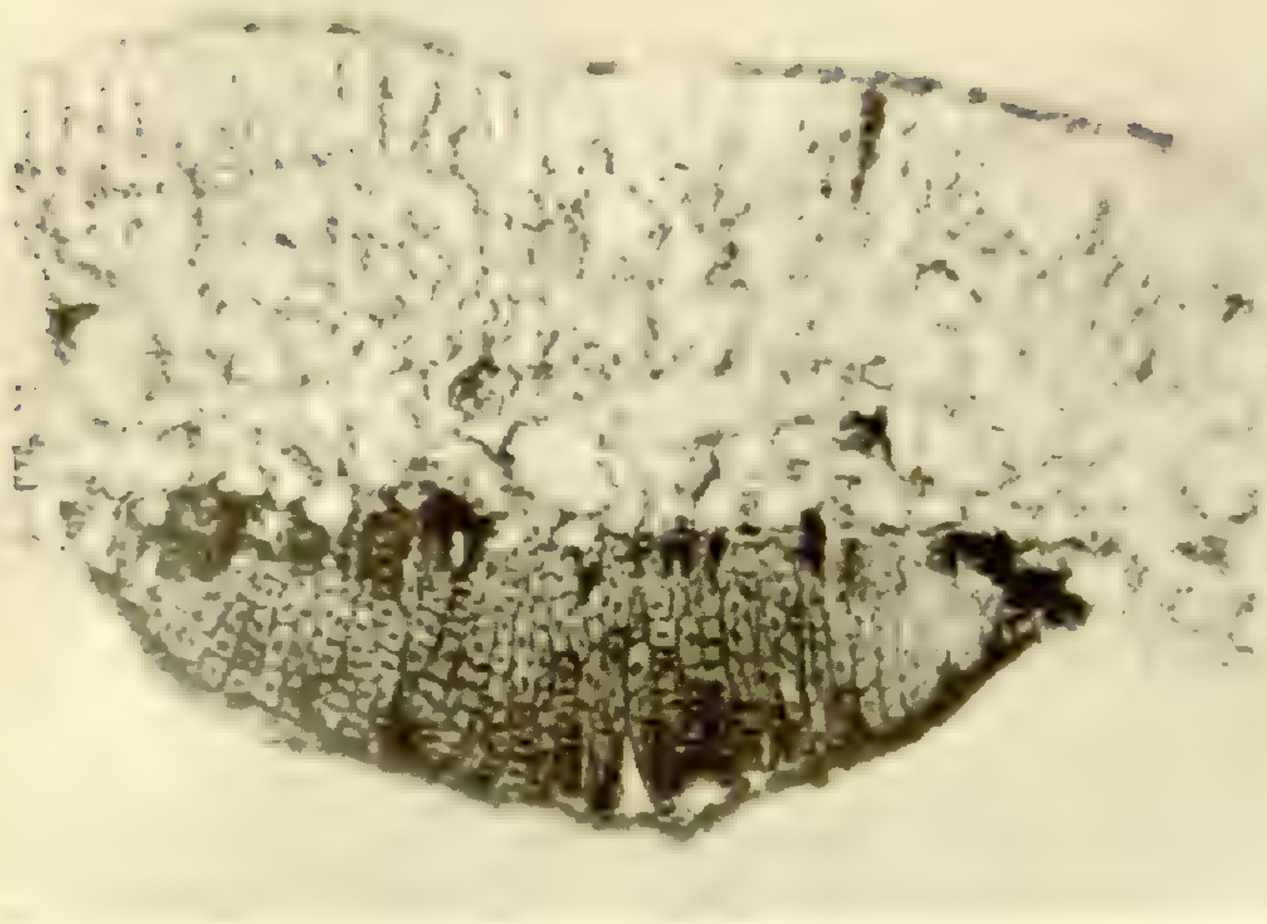
Figs. 1–5 refer to *Chrysomyxa Rhododendri*; figs. 6–8 to *Chrysomyxa abietis*.

Chrysomyxa Rhododendri.

FIG. 1. Photograph of transverse section of leaf of *Rhododendron hirsutum* bearing teleuto-sorus. × about 126.
FIG. 2. Photograph of leaf of *Picea excelsa* bearing two aecidia. × 3.5.
FIG. 3. Part of pseudoperidium; the upper cells are shown in surface view, the lower in optical section. × 480.
FIG. 4. Aecidiospore seen in surface view. × 960.
FIG. 5. Aecidiospore seen in optical section. × 960.

Chrysomyxa abietis.

FIG. 6. Photograph of leaves of *Picea excelsa* bearing teleuto-sori. × 3.5.
FIG. 7. Photograph of transverse section of leaf of *Picea excelsa* bearing two teleuto-sori, × 57.
FIG. 8. Two teleutospores. × about 192.



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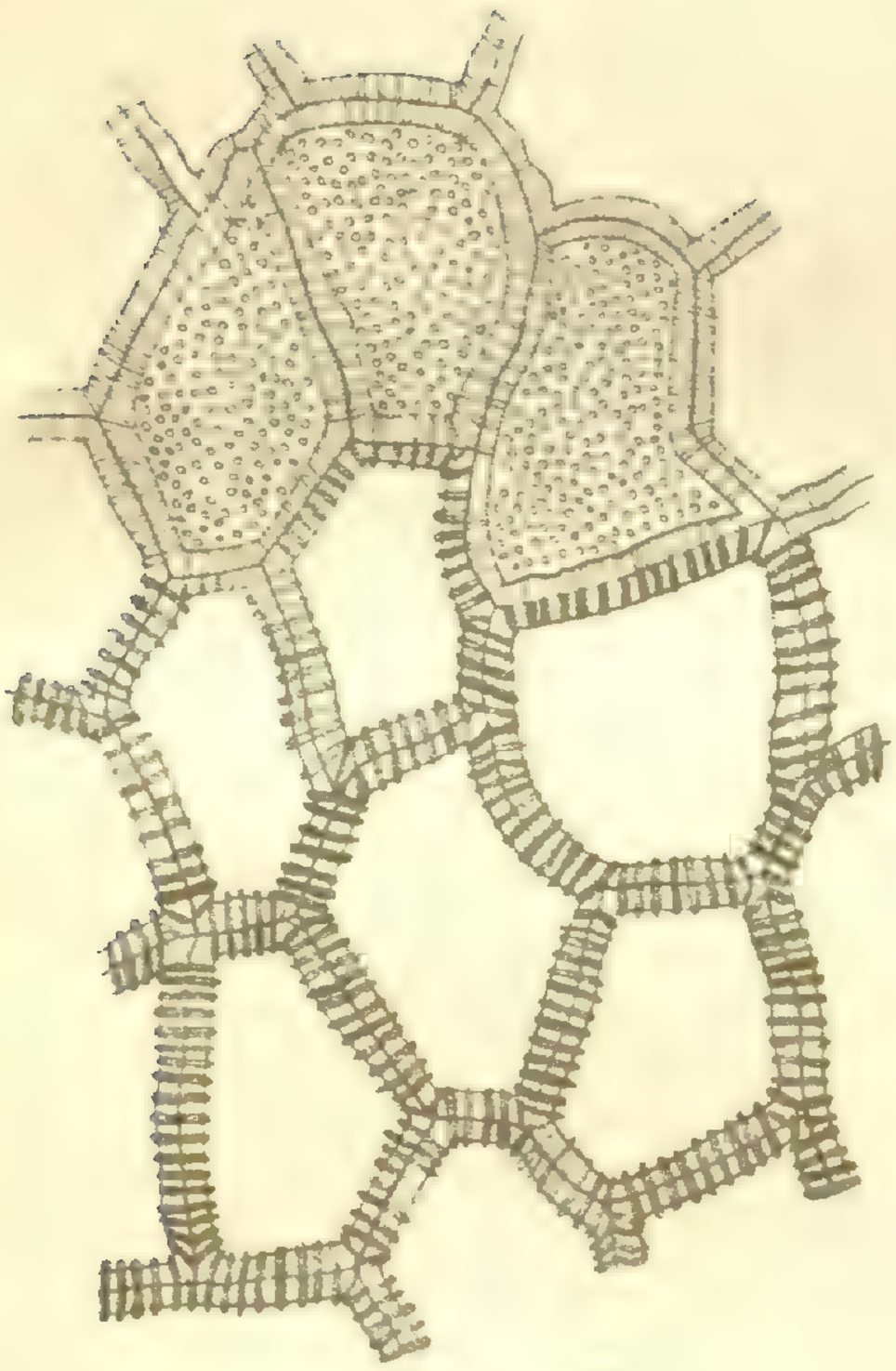

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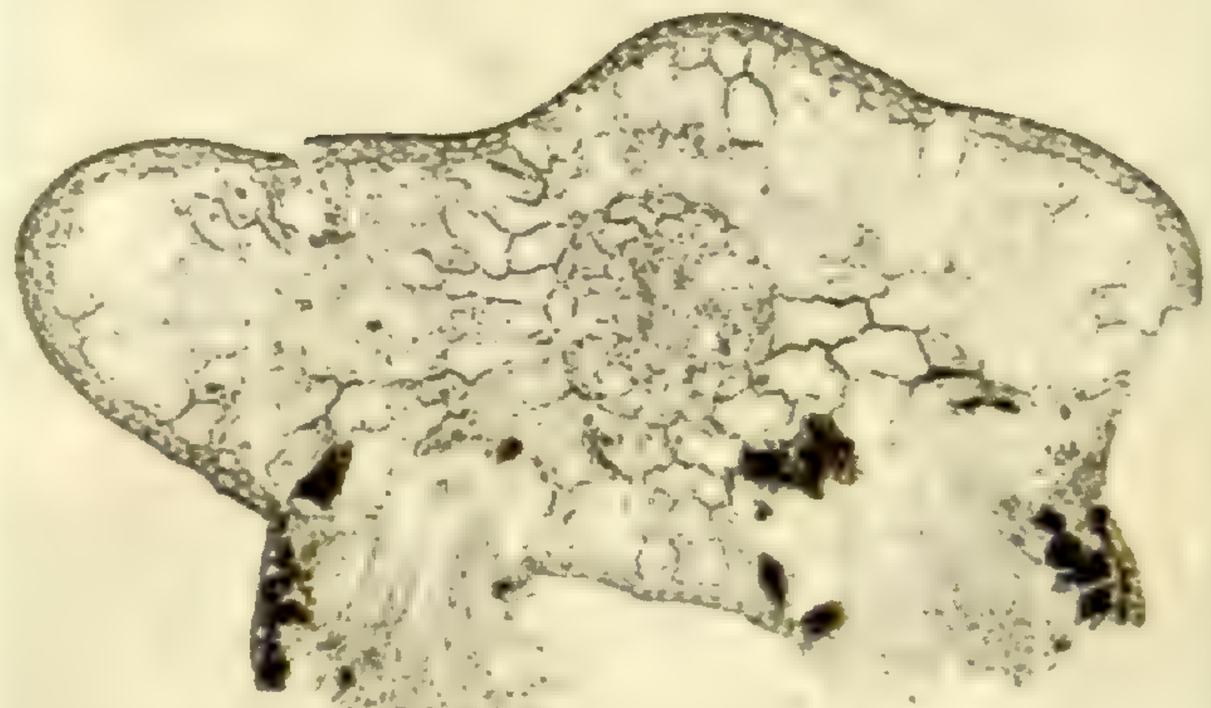

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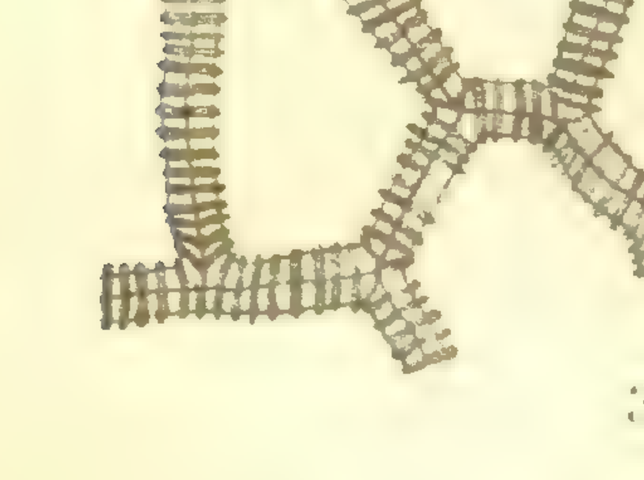

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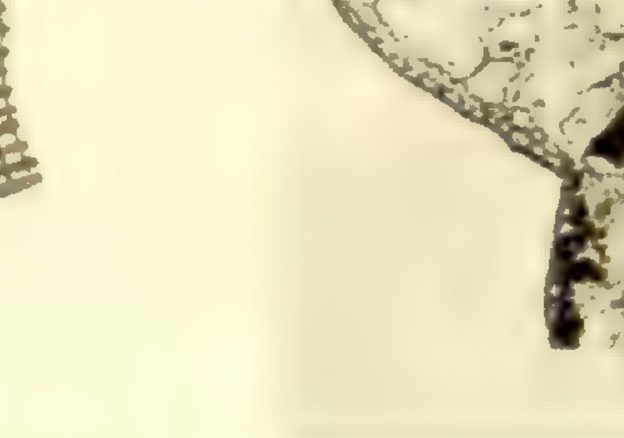

5.

8.

M.Videl

Imp. Int. et Lap

1–5 Chrysomyxa Rhododendri 6–8 Ch. Abietis.

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NOTES

FROM THE

ROYAL BOTANIC GARDEN, EDINBURGH.

FEBRUARY 1916.

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PRINTED UNDER THE AUTHORITY OF HIS MAJESTY'S STATIONERY OFFICE
By NEILL & CO., LIMITED,
At Bellevue.

SOLD AT THE GARDEN,
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DIAGNOSES

Specierum novarum

in herbario Horti Regii Botanici Edinburgensis cognitarum.

CLI–CCL.

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Vitex yunnanensis, W. W. Sm., p. 141.

Abelia buddleioides, W. W. Sm. Sp. nov.

Species sectionis *Zabeliae,* Rehder ; pedunculis pedicellisque nullis vel subnullis, floribus ad 2.8 cm. longis subcapitatis, sepalis 5, corolla extus dense reflexo-pilosa inter species alias illius sectionis conspicua.

Frutex 1–2 m. altus ; ramuli graciles juniores pilis setosis reflexis longiuscule induti virides, annotini cinerei tarde glabrescentes. Folia usque ad 3 cm. longa, 5–14 mm. lata, ovato-lanceolata vel ± anguste lanceolata, apice acuta vel subacuta basi anguste vel late cuneata in petiolum ± 2 mm. longum setosum, in sicco chartacea, margine integra, supra obscure viridia glabra pilis paucis setosis marginem versus exceptis, infra pallidiora venis inconspicuis, glabra pilis setosis ad marginem atque ad costam exceptis. Flores ad ramulorum apices

conferti ; saepius inferiores 2 superiores 4–6 subcapitati ; pedunculi pedicellique nulli vel subnulli ; bracteae lineari-subulatae ± 4 mm. longae. Ovarium 4–5 mm. longum anguste ovoideum alte sulcatum longiuscule setosum. Sepala 5, linearia, 4–5 mm. longa, vix 1 mm. lata, setoso-ciliata. Corolla tubuloso-infundibularis pallido-rosea ; tubus cylindricus 2–2.1 cm. longus, basi circ. 2.5 mm. latus, supra sub ore fere ad 4 mm. (in sicco) latus, extus pilis setosis reflexis dense praeditus, intus minus dense, lobi subrotundati patentes fere 3 mm. diametro extus setosi intus puberuli. Stamina inclusa filamentis longiuscule setosis. Stylus glaber vix exsertus, staminibus longior. Fructus maturi desunt.

" Shrub of 3–6 ft. Flowers pale rose. Amongst scrub in open situations in the mountains of the Chungtien plateau, Yunnan. Lat. 27° 30′ N. Alt. 10,000 ft. July 1914." G. Forrest. No. 12,636.

Var. **divergens,** W. W. Sm. Var. nov.

Foliis latioribus crassioribus floribus fructibusque minoribus differt ; structura floris omnino quadrat.

" Shrub of 6–8 ft. Flowers rose-pink. In open scrub in the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 10,000 ft. July 1913." G. Forrest. No. 10,500.

" Shrub of 6–9 ft. In fruit. In open thickets on the Lichiang Range, Yunnan. Lat. 27° 40′ N. Alt. 10,000–11,000 ft. July 1913." G. Forrest. No. 10,290.

Abelia gracilenta, W. W. Sm. Sp. nov.

Species affinis *Abeliae Forrestii*, Diels (sub *Linnaea*) a qua tubi corollini forma, fructu puberulo nec pilosulo inter alia abunde discrepat.

Frutex ± 2 m. altus ; ramuli divaricato-patentes graciles superne floriferi juniores incano-tomentelli purpureo-tincti, vetustiores cinerei decorticantes. Folia vulgo ± 2 cm. longa, ± 7 mm. lata, lanceolata apice acuta vel subacuta basi ± late cuneata in petiolum vix 1 mm. longum, in sicco chartacea, margine integra, supra obscure viridia infra pallidiora utrinque glabra vel subglabra, nonnunquam praesertim ad margines hic illic pilis minimis conspersa ; nervi utrinque praeter costam inconspicui. Flores in axillis solitarii vel raro bini ; pedunculi 3–7 mm. longi puberuli bracteis subulatis minimis praediti ; pedicelli 1–2 mm. longi puberuli bracteolis minimis ornati. Ovarium circ. 7 mm. longum cylindricum puberulum. Sepala 5 lineari-oblonga vel lineari-oblanceolata, 6–7 mm. longa, circ.

1.5 mm. lata nervosa puberula viridia. Corolla campanulato-infundibularis pallido-rosea ; tubus circ. 2 cm. longus, dimidio inferiore anguste cylindricus basi 1 mm. latus, supra ventricoso-ampliatus ore fere 1 cm. latus (in sicco), extus pilosulus minute glandulosus intus sparse pilosulus ; lobi 5 ovati vel subrotundati ± 5 mm. diametro utrinque puberuli. Stamina medium limbum attingentia antheris circ. 2 mm. longis filamentis tubum corollinum subaequantibus per omnes partes albido-patenti-pilosulis. Stylus staminibus paulo longior albido-patenti-pilosulus. Fructus maturi desunt.

"Shrub of 6–7 ft. Flowers pale rose. Amongst scrub in open dry situations on the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 9000–10,000 ft. Sept. 1913." G. Forrest. No. 11,225.

Var. **microphylla,** W. W. Sm. Var. nov.

Habitu minore, foliis ± 1 cm. longis, floribus minoribus recedens.

"Shrub of 2–4 ft. Flowers white. Open dry situations in the mountains in the N.E. of the Lichiang Range, Yunnan. Lat. 27° 45′ N. Alt. 10,000–11,000 ft. July 1913." G. Forrest. No. 10,310.

"Shrub of 4–5 ft. Flowers rose-pink. In open scrub in the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 10,000–11,000 ft. July 1913." G. Forrest. No. 10,348.

Allium Purdomii, W. W. Sm. Sp. nov.

Species sectionis *Rhiziridii* ex affinitate *A. cyanei,* Regel et *A. clathrati,* Ledeb. ; ab hoc floribus coeruleis, ab illo foliis filiformibus differt.

Planta gracilis. Rhizomatis bulbi anguste cylindrici caule vix crassiores caespitosi ; tunicae exteriores reticulato-fibrosae adpressae bulbum arcte involventes. Caulis 15–20 cm. altus folia superans vel subaequans erectus nudus basi foliatus striatulus gracillimus glaber. Folia subtereti-filiformia eis *Festucae ovinae,* Linn. forma subsimilia. Umbella pauciflora (± 7), laxiflora, spathā albido-scariosa ut videtur univalvi, valva anguste ovata acuminata circ. 5 mm. longa, pedicellis 7–8 mm. longis erectis praedita. Perigonii phylla elliptico-oblonga obtusa circ. 4 mm. longa coerulea. Filamenta filiformia perigonio subduplo longiora integerrima. Ovarium trigono-globosum stylo filiformi filamenta paulo superante terminatum.

"Very distinct with grassy foliage and blue flowers. Only noted on Lotus Mountain in the high turf in very shallow soil on

rock at the end of August 1914; Kansu, West China. Alt. 12,000 ft. Coll. W. Purdom; ipse non vidi." Farrer and Purdom. No. 321.

Anemone Howellii, J. F. Jeff. et W. W. Sm. Sp. nov.

Species foliis longe petiolatis simplicibus ovatis acuminatis inter congeneres yunnanenses notanda; fortasse ad *A. begoniifoliam,* Lévl. appropinquat a qua ex descriptione exigua signis nonnullis discrepat.

Rhizoma repens sat crassum glabratum nec comosum. Folia ± 5, omnia radicalia, petiolo 8–12 cm. longo sparse albo-villoso praedita, 5–7.5 cm. longa, 4–5.5 cm. lata, ovata apice sensim longiuscule acuminata basi alte (fere 2 cm.) cordata ad quartam vel quintam partem lobatula subregulariter indurato-apiculato-dentata setosulo-ciliata membranacea supra atro-viridia subsparse adpresse albido-setosa infra glabrata nervis ± dense adpresse albido-setosis exceptis. Scapus erectus usque ad 30 cm. altus gracilis infra sparse pilosulus supra sub foliis involucrantibus densius; folia involucrantia ad basim pedicellorum vix 5 mm. superantia ovata incisa pilosa. Pedicelli 2–3, usque ad 4 cm. longi, fructu aucti, ± pilosi. Flores mediocres fere 2 cm. lati. Sepala 5, late obovata vel suborbiculata 8–9 mm. diametro utrinque glabra. Stamina ± 5 mm. longa filamentis glabris antheris vix 1 mm. longis. Achaenia 15–20, vix matura circ. 2 mm. longa compressiuscula marginibus incrassata glabra in stylum brevissimum abeuntia.

Neighbourhood of Tengyueh, Yunnan, West China. Howell. No. 110.

Aster Farreri, W. W. Sm. et J. F. Jeff. Sp. nov.

Species affinis *A. Vilmorini,* Franch. et *A. Delavayi,* Franch. a quibus foliis multo angustioribus inter alia signa differt.

Caulis simplex ± 45 cm. altus monocephalus infra bene foliatus pilis longis albidis confervoideis conspersus supra fere nudus glabrescens vel ± sparse pilosulus. Folia inferiora 8–10 laxiuscule approximata, erecta, 10–15 cm. longa (petiolo incluso), 7–10 mm. lata, linearia vel lineari-lanceolata, acuta vel breviter acuminata, basalia sensim in petiolum alatum ± 4 cm. longum angustata, caulina sessilia semiamplexicaulia omnia margine integra, utrinque pilis sparsis albidis scaberula; folia suprema 3–4, linearia 3–5 cm. longa. Capitula longe pedunculata ampla ad 8 cm. diametro (cum ligulis). Involucri phylla 2–3-seriata perplurima herbacea linearia longiuscule acuminata ± 1.5 cm. longa, exteriora longe albido-pilosa interiora glabrescentia marginibus hyalinis. Ligulae ± 100, 2–3-seriatae 3–3.5 cm.

longae 1.5 mm. latae lineares purpureo-caeruleae. Floris tubulosi corolla 6 mm. longa lutescens extus villosula. Receptaculum alveolatum. Achaenia (immatura) oblonga obscure quadrangula 2–3 mm. longa sparse pilosa; pappi biseriati sordide albi setae interiores circ. 6 mm. longae, exteriores 1 mm. longae.

"Very handsome and sporadic in the higher valley fields and alps of Tibet, in hay grass along with No. 173, but not ascending so high. 12th August 1914; East Tibet, near Kansu frontier." Farrer and Purdom. No. 174.

A beautiful species closely akin to *A. Delavayi*, Franch. and *A. Vilmorini*, Franch. already in cultivation. We have referred it to *Aster* rather than to *Erigeron* to keep it in company with the allies mentioned. Franchet has pointed out that these two species form a transition between the two genera.

44912

Aster glarearum, W. W. Sm. et Farrer. Sp. nov.

Species ex affinitate *A. tongolensis*, Franch., habitu simillima, involucri phyllis atque pappo inter alia divergit; haud remota ab *A. likiangensi*, Franch.

Caulis monocephalus erectus gracilis 12–20 cm. altus basim versus sat foliosus superne fere nudatus, pilis longiusculis albidis plus minusve dense praeditus. Folia basilaria et inferiora ± 6 approximata circ. 3 cm. longa (petiolo incluso) 5–7 mm. lata, oblanceolata obtusa in petiolum alatum sensim angustata, mediana 1–2 minora sessilia, superne unum lineare vel nullum; omnia supra pilis densis scaberula infra sparsius induta. Capitula longe pedunculata, ope radiorum circ. 4 cm. lata. Involucri phylla biseriata herbacea lanceolata acuta 5–7 mm. longa extus pilis nigris et pilis albidis intermixtis villosa. Ligulae 30–40, uniseriatae, 1.8 cm. longae, 2 mm. latae purpureo-coeruleae. Floris tubulosi corolla circ. 6 mm. longa lutea. Achaenia (immatura) 1.8 mm. longa pilis adpressis albo-sericeis conspersa; pappus sordide albus 6 mm. longus, setae exteriores brevissimae.

"High alpine shingles above Siku, 11,000–12,000 ft. 21st June 1914; Kansu, West China." Farrer and Purdom. No. 131.

A very graceful little plant recalling *Aster likiangensis*, Franch., which has been in cultivation and *A. tongolensis*, Franch., of which it might easily be taken for a variety. The latter plant, however, has reddish pappus much shorter than the achene.

Farrer and Purdom No. 492 appears to be a variety of this species; it has broader leaves (1–1.5 cm.) and larger capitula (up to 5 cm. diam.) more densely villous than those of type.

Of it Mr. Farrer says: "High alpine shingles. Locality forgotten. It was considered only a form of No. 131. But these Asters, all of them, high alpine, alpine, and lowland are infinitely puzzling."

Aster limitaneus, W. W. Sm. et Farrer. Sp. nov.

Species ex affinitate *A. tongolensis*, Franch. involucri phyllis, acheniis, pappo divergens.

Caulis simplex 25–45 ćm. altus monocephalus pilis longis patentibus albis conspersus infra bene foliatus supra subnudus. Folia radicalia vel subradicalia 6–10, oblanceolata vel subspathulata, 5–8 cm. longa, 1–1.5 cm. lata, apice rotundata vel obtusa basi sensim in petiolum vix discretum alatum attenuata, caulina 5–6 remota sessilia linearia circ. 2 cm. longa, omnia margine integra *longiuscule albo-ciliata*, supra vulgo glabra, infra ad costam nervosque sparse longiuscule albo-pilosa. Capitula longe pedunculata ampla ope radiorum 5–6 cm. diametro. Involucri phylla 2–3-seriata perplurima herbacea oblonga subacuta 6–8 mm. longa, circ. 1.5 mm. lata, omnia per marginem totam longiuscule albo-ciliata, caetera glabra vel subglabra. Ligulae 30–45, circ. 2.5 cm. longae, 2.5 mm. latae, apice subintegrae, saturate coeruleae. Disci flores 4 mm. longi, flavi, extus sparse pilosuli. Achaenia (immatura) 2 mm. longa obovata pilosa. Pappus uniseriatus rigidus inaequalis 1.5–2 mm. longus fulvidus.

"Beautiful in the high meadows and ridges of Eastern Tibet, near Kansu frontier, up to 11,000–12,000 ft.; in flower on the grassy arêtes and passes, 7th–21st July 1914." Farrer and Purdom. No. 173.

No. 226 is a variety. "It replaces No. 131 in the highest shingles of the Tibetan alps, 12,000–13,000 ft. 14th August 1914."

Of smaller size, but otherwise not far from the typical plant.

Aster sikuensis, W. W. Sm. et Farrer. Sp. nov.

Species habitu foliisque simillima *A. holophyllo*, Hemsl. a quo acheniis pappoque multo differt.

Caulis fruticulosus ramosus gracilis striatulus bene foliatus undique molliter breviterque pilosulus; pars superior tantum visa; planta verosimiliter 30 cm. alta vel paulo elatior; basim versus defoliatus esse videtur. Folia vix petiolata anguste oblongo-lanceolata vel subelliptica vulgo ± 2 cm. longa, 5 mm. lata, apice subobtusa apiculata basi late cuneata vel subrotundata, chartacea, integerrima, supra atroviridia dense minute puberula, infra dense cinerascenti-tomentella; costa supra

paulo impressa infra eminens ; nervi supra evanidi infra sat conspicui ; folia superiora minora, suprema linearia. Ramuli floriferi 10–20 rami apicem versus laxe corymboso-aggregati 3–5 cm. longi, fere recto angulo saepe abeuntes vulgo capitulum solitarium gerentes, canescenti-puberuli ; capitula vix 1 cm. alta, diametro circ. 2 cm. Involucri phylla circ. 4-seriata, interiora 4–5 mm. longa lanceolata marginibus hyalina apice villosa obtusa vel subacuta, exteriora 2–3 mm. longa ovata dorso canescentia apice roseo-rubro-tincta. Receptaculum planum alveolatum. Flores ligulati fere 2 cm. longi, 1.5 mm. lati. Flores tubulosi 4–5 mm. longi, medio tubo subito ampliati glabrescentes. Achaenia (immatura) 1.5 mm. longa 0.5 mm. lata anguste ovata paulo complanata pilosa ; pappus uniseriatus 3–4 mm. longus sordide albus.

" Stony places and hot banks about Siku, Kansu, Western China. October 1914." Farrer and Purdom. No. 456.

Berberis Jamesiana, G. Forrest et W. W. Sm. Sp. nov.

Species affinis *B. Francisci-Ferdinandi,* Schneider sectionis *Tinctoriarum* ; foliis obovatis vel oblanceolatis saepius integris utrinque dense papillosis recedit.

Frutex ad 2 m. altus ; ramuli juniores striato-sulcati minute verruculosi glabri laete rubri, vetustiores diu rubridi ; spinae plerumque simplices ad 2.5 cm. longae rubridae. Folia 2–6-fasciculata, plerumque 3–4 cm. longa, ± 2 cm. lata, obovata vel late oblanceolata, apice rotundata vel obtusissima saepe breviter apiculata, basi in petiolum ± 5 mm. longum sensim attenuata, margine integra vel dentibus minutis spinoso-denticulata, coriacea utrinque epilosa, utrinque dense papillosa, utrinque anguste et distincte elevato-reticulata, supra vix nitentia infra pallidiora opaca. Inflorescentiae racemosae usque ad 10 cm. longae (pedunculo nudo ad 2 cm. longo incluso) ± 20-florae glabrae ; pedicelli ± 1 cm. longi ; flores desunt. Fructus subglobosi in sicco circ. 1 cm. diametro stigmatibus sessilibus, laete scarlatini. Semina plerumque duo.

" Spinous shrub of 5 ft. In fruit. Fruits bright scarlet. Open situations amongst rocks on the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 11,000 ft. October 1913." G. Forrest. No. 11,474.

" Shrub of 6 ft. In fruit. Fruits purplish ? drying pink ! Open stony pasture in the mountains of the Chungtien plateau, Yunnan. Lat. 27° 55′ N. Alt. 11,000 ft. July 1913." G. Forrest. No. 10,633.

" Shrub of 4–6 ft. In fruit. Fruits bright red. Open situations amongst scrub on the Mekong-Salween divide, Yunnan.

Lat. 28° 10′ N. Alt. 11,000 ft. Oct. 1914." G. Forrest. No. 13,566.

In No. 10,633 the fruits are scarcely mature ; in No. 13,566 the leaves are larger than in the type-plant No. 11,474 and, while some are obovate and oblanceolate, others are elliptic to nearly orbicular. The plant is dedicated to a brother of the collector.

535 **Berberis leucocarpa,** W. W. Sm. Sp. nov.

Species affinis *B. Jamesianae,* G. Forrest et W. W. Sm. a qua foliis multo minus coriaceis, nervatione diversa, fructibus ex collectore albis divergit.

Frutex 2–3 m. altus ; ramuli juniores subteretes graciles distincte verruculosi glabri laete rubri ; spinae simplices vel trifidae ad 2.5 cm. longae rubridae. Folia 2–5-fasciculata, plerumque 4–8 cm. longa petiolo 1–1.5 cm. incluso, 2–3 cm. lata, obovata vel subelliptica, apice rotundata vel obtusissima saepius breviter apiculata, basi in petiolum sensim attenuata, margine dentibus minutis crebre spinoso-denticulata, tenuiter coriacea, utrinque epilosa papillosa, supra viridia haud nitentia nervis paululo elevatis subdistinctis, infra pallidiora nervis elevatis distinctis. Inflorescentiae racemosae usque ad 12 cm. longae (pedunculo nudo 3–5 cm. longo incluso) ± 20-florae glabrae ; pedicelli ± 1 cm. longi ; flores desunt. Fructus elliptico-globosi circ. 1 cm. longi, 7–8 mm. lati, stigmatibus sessilibus albi. Semina plerumque duo.

"Shrub of 6–8 ft. In fruit. Fruits white. Open scrub and amongst rocks on the Mekong-Yangtze divide, Yunnan. Lat. 27° 45′ N. Alt. 11,000 ft. July 1914." G. Forrest. No. 12,855.

Distinguished from the preceding species by the less coriaceous leaves and the white fruit ; the habit, form of inflorescence, and the red shoots are very similar.

536 **Berberis mekongensis,** W. W. Sm. Sp. nov.

Species affinis *B. brachypodae,* Maxim. et *B. dasystachyae,* Maxim. a quibus foliis subsessilibus inter alia facile dignoscitur.

Frutex circ. 2 m. altus ; ramuli vetustiores striato-sulcati minute verruculosi glabri cinerei ; spinae trifidae robustae ad 2.5 cm. longae. Folia (ramulorum fructiferorum) ad 7–8-fasciculata, petiolo brevissimo vix 1 mm. longo suffulta, vulgo 2–3 cm. longa, 1.2–1.7 cm. lata, obovata apice rotundata basi late cuneata, margine spinoso-dentata spinis subapproximatis 1 mm. haud superantibus, nonnunquam subintegra, siccitate membranacea, utrinque fere concoloria, vix nitentia, supra nervis obscurioribus

infra laxe reticulatis. Inflorescentiae racemosae ± 15-florae, fructu circ. 3 cm. longae, glabrae vel minute puberulae ; pedicelli 5–10 mm. longi ; flores desunt. Fructus ovali-oblongi ± 8 mm. longi, ± 4 mm. lati, stigmatibus sessilibus ; semina 1–2.

" Spinous shrub of 6 ft. In fruit. Open situations amongst scrub on the Bei Ma Shan, Mekong-Yangtze divide, Yunnan. Lat. 28° 20′ N. Alt. 12,000 ft. Aug. 1914." G. Forrest. No. 13,204.

A species of the section *Vulgares*, Schneider, closely allied to the Kansu species *B. brachypoda*, Maxim. and *B. dasystachya*, Maxim. from which it is separated by the almost sessile leaves. The thick shoots are densely covered with the racemes of fruit.

537 **Berberis sublevis,** W. W. Sm. Sp. nov.

Species sectionis *Wallichianae*, Schneider, affinis *B. levi*, Franch. a qua foliis lineari-lanceolatis tenuiter coriaceis subtus haud enerviis inter alia recedit.

Frutex 1–2 m. altus ; ramuli juniores striato-sulcati, minute verruculosi glabri cinerei ; spinae trifidae robustae ad 3 cm. longae. Folia 1–6-fasciculata, 5–7 cm. longa, 1–1.5 cm. lata, lineari-lanceolata, apice acuta spinoso-mucronata, basi in petiolum brevissimum cuneata, margine regulariter crebre spinoso-serrata, tenuiter coriacea, facie superiore hypodermate pertinente haud instructa, supra nitentia (nonnunquam obscure) subtus pallidiora nitentia nervis bene reticulatis paululo elevatis. Flores ± 12-fasciculati, saepe pauciores mediocres flavi ; pedicelli graciles ± 2 cm. longi ; prophylla triangulari-lanceolata. Sepala externa triangulari-ovata vix 1.5 mm. longa, interna late ovata ± 2 mm. longa. Petala late obovata apice emarginata basi breviter unguiculata nectariis elongatis praedita circ. 7 mm. longa. Ovaria ovulo solitario instructa. Fructus 6–7 mm. longi circ. 3.5 mm. lati elliptici saturate rubri stylis brevissimis.

" Spinous shrub of 5 ft. Flowers deep yellow. Open scrub on hills west of Tengyueh, Yunnan. Lat. 25° N. Alt. 6000 ft. Feb. 1913." G. Forrest. No. 9559.

" Spinous shrub of 3–5 ft. Flowers yellow. Open scrub on hills to north-west of Tengyueh. Lat. 25° 10′ N. Alt. 7000 ft. Feb. 1913." G. Forrest. No. 9693.

" Spinous shrub of 4–5 ft. Flowers yellow, tinged red on exterior, amongst scrub on hills to the south of Tengyueh Lat. 25° N. Feb. 1913." G. Forrest. No. 9560.

" Spinous shrub of 3–5 ft. In fruit. Fruits deep red. Amongst scrub in side valleys in the hills to the east of

Tengyueh. Lat. 25° N. Alt. 6000 ft. May 1913." G. Forrest. No. 7621.

"Spinous shrub of 3–6 ft. In fruit. Fruit red. Open situations in and on the margins of pine forests in the hills to the west of Tengyueh. Lat. 25° N. Alt. 6000 ft. Aug. 1912." G. Forrest. No. 8635.

"Spinous shrub of 3–4 ft. Flowers dull olive-yellow. Margins of pine forests and amongst scrub in the hills around Tengyueh. Lat. 25° N. Alt. 6000 ft. March 1914." G. Forrest. No. 12,198.

This species is allied to *B. levis*, Franch. from which it is readily distinguished by the characters of the leaves—linear-lanceolate, thinly coriaceous, and with the secondary nerves on the under side distinctly visible.

1144 **Buddleia Farreri,** Balf. f. et W. W. Sm. Sp. nov.

Species distinctissima ex affinitate *B. agathosmatis*, Diels; foliis hastatis subtus niveo-tomentosis, inflorescentiis late paniculatis quam folia praecocioribus inter alia conspicua.

Frutex ex collectore 1–2 m. altus ramis teretiusculis tomento stellato denso mollissimo detersili niveo indutis, sub tomento brunneis multistriatulis. Folia opposita petiolo 1–2 cm. longo dense niveo-tomentoso praedita, superiora (cetera non visa) 6–12 cm. longa, 3–6 cm. lata, ovato-oblonga, apice breviter acuminata vel acuta vel obtusiuscula, basi hastata vel breviter truncato-cordata, chartacea margine grosse dentata dentibus magnis parvisque subregulariter alternantibus, supra primo dense niveo-tomentosa mox subglabrescentia grisea bene reticulata nervis 6–10 paribus nervulisque impressis, subtus dense stellato-niveo-tomentosa nervis paulo elevatis. Inflorescentiae late paniculatae, usque ad 20 cm. longae, ad 15 cm. latae, ramulis inferioribus fere recto angulo abeuntibus omnibus dense niveo-tomentosis, cymulis apices ramulorum versus approximatis ± 12-floris, pedunculis ultimis pedicellisque brevissimis, bracteis basim cymularum versus raris linearibus 5–10 mm. longis niveo-tomentosis, floribus subcapitatis. Calyx tubulosus circ. 4 mm. longus tubo corollae adpressus, extus dense niveo-stellato-tomentosus, intus glaber dentibus 1 mm. longis oblongis obtusis. Corollae tubus circ. 8 mm. longus circ. 1.5 mm. latus glaber; lobi rotundati 1.5–2 mm. diametro. Stamina medio tubo inserta. Ovarium circ. 2 mm. longum infra glabrum supra albo-tomentellum; stylus circ. 3 mm. longus. Fructus deest.

"This noble bush of 4–6 ft., with ample boughs of huge flannelly foliage, hugs only the very hottest and driest crevices, cliffs, walls, and banks down the most arid and torrid aspects

of the Ha Shiu fang (about Siku), and the baking stony defiles of the Feng S'an Ling (S. side). It does not range northward, and the flowering specimen was gathered from a strange outlying colony at the edge of subalpine coppice below Chago, in the Satanee Valley on 8th May. These magnificent thyrses appear *before* the leaves, which afterwards unfold to hide all trace of them : they suggest a glorified *Veronica Hulkeana* on a big scale, and have the most delicious scent of raspberry ice. Kansu, West China." Farrer and Purdom. No. 44 in Herb. Edin.

This should prove a very decided acquisition to horticulture. The leaves are very beautiful, and with the ample inflorescences justify Mr. Farrer's description of this plant as a noble bush. The foliage suggests to us an affinity with *B. agathosma*, Diels, but the relationship is not close.

Buddleia glabrescens, W. W. Sm. Sp. nov.

Species habitu similis *B. Davidii*, Franch. a qua aliisque affinibus foliis ± remote dentatis calyce glabro vel subglabro inter alia signa dignoscitur ; a *B. albiflora*, Hemsl. foliis subsessilibus inflorescentia valde diversa floribus multo majoribus differt.

Frutex ramosus 1–3 m. altus ramis robustis quadrangulatis vel subquadrangulatis primo sparse fulvo-tomentellis vel fulvo-pilosulis vel subglabris, omnibus cito glabris vel glabrescentibus. Folia opposita petiolo brevissimo vix 1 mm. longo suffulta vel subsessilia, vulgo 5–6 cm. longa, 2–2.5 cm. lata, ovato-lanceolata vel ovata, apice longiuscule acuminata vel acuta, basi plus minusve late cuneata, integra vel remote sinuato-denticulata vel dentata, in sicco membranacea, supra nunc sparse fulvo-tomentosa nunc sparse pilosula infra nunc dense fulvo-tomentosa nunc sparse pilosula minute glandulosa ; nervi 5–6-paria in foliis glabrioribus satis conspicui. Inflorescentiae amplae ; ramuli superiores elongati foliosi inflorescentia ± 12 cm. longa ± 5 cm. lata effusa terminati (cf. specimina sub n. 12,753) ; ramuli inferiores breves inflorescentia magis compacta ± 6 cm. longa ± 4 cm. lata onusti (cf. sub n. 12,433) ; cymulae plurifloraे pedunculis ± 1 cm. longis tomentellis vel subglabris suffultae ; bracteae bracteolaeque lineares vel subulatae ; pedicelli 2–4 mm. longi graciles glabri vel sparse pilosi. Calyx anguste tubulosus circ. 4 mm. longus tubo corollae adpressus, extus viridis intervallis subscariosis glaber vel raro pilis paucis praeditus, nunquam tomentosus, intus glaber, dentibus 1 mm. longis subulatis. Corollae saturate coeruléo-lavendulaceae tubus 9–10 mm. longus circ. 1.5 mm. latus, extus parte inferiore glaber supra albido-tomentellus glandulis nitentibus conspersus, intus albido-pilosulus ; lobi rotundati circ. 3 mm. diametro extus tomentelli

glandulosi intus subglabri. Stamina paulo supra medium tubum inserta. Ovarium glabrum. Fructus anguste ovoideus circ. 4 mm. longus.

"Shrub of 4–9 ft. Flowers very deep blue-lavender, throat and tube tinged rose, fragrant. Open situations amongst scrub at the north end of the Chien-Chuan Valley, Yunnan. Lat. 27° N. Alt. 8000–9000 ft. May 1914." G. Forrest. No. 12,433.

"On the Chungtien plateau, Yunnan. Lat. 27° 30′ N. Alt. 10,000 ft. July 1914." G. Forrest. No. 12,753.

1180 **Buddleia limitanea,** W. W. Sm. Sp. nov.

Species affinis *B. Forrestii,* Diels a quā foliis tenuiter membranaceis subtus tomentello parcissimo fere obsoleto praeditis, inflorescentiis laxis, cymis paucifloris, calyce corollaque multo minus pilosis recedit.

Frutex 1–2 m. altus ramulis gracilibus subteretibus infra glabris supra ± sparse stellato-pilosulis vel glabrescentibus. Folia superiora petiolo 2–5 mm. longo suffulta, 6–12 cm. longa, 2–3 cm. lata, lanceolata vel oblanceolata, apice acuminata vel raro paulum rotundata, basi cuneatim attenuata, margine crebre serratula serraturis calloso-apiculatis, in sicco tenuiter membranacea, supra viridia sparse scabridule puberula, subtus subolivacea tomentello exiguo vel fere deficiente praedita. Inflorescentiae laxae e cymis pedunculatis 1–3-floris compositae 5–7 cm. longae primo tomentellae mox glabrescentes. Flores pedicellis 2–3 mm. longis sparse pilosis suffulti rosei (?) Calycis 4–5 mm. longi tubus glaber vel subglaber ad trientem in dentes triangulares sinu lato separatos apice ± recurvos subcalloso-apiculatos divisus. Corolla circ. 1 cm. longa ; tubus 3–3.5 mm. latus, extra glaber vel parce pilosus intus pilosus, lobi circ. 2.5 mm. diametro pilosuli vel glabrescentes. Stamina ad medium tubum affixa. Ovarium glabrum ± 3 mm. longum stylo clavato ad 4 mm. longo. Fructus maturus circ. 1 cm. longus glaber venulis sub lente conspicuis.

"Shrub of 3–4 ft. In fruit. Open scrub on the western flank of the Shweli-Salween divide, Yunnan. Lat. 25° 20′ N. Alt. 7000–8000 ft. Aug. 1912." G. Forrest. No. 8962.

"Shrub of 3–6 ft. Flowers pinkish. Half shade on granite hills, Hpimaw, Northern Burma, 9000–10,000 ft. Aug. 1914." Kingdon Ward. No. 1867.

The Northern Burma plant I take to be the same as the Yunnan specimen which is in fruit. The species is closely allied to *B. Forrestii,* Diels, which is very distinct from all previously described species of this genus. The new species is a smaller weaker plant with thin leaves and sparing tomentum, and with a lax and few-flowered inflorescence.

Buddleia Purdomii, W. W. Sm. Sp. nov.

Species valde affinis *B. nanae,* W. W. Sm., speciei yunnanensi, habitu simillima, foliis obtusioribus utrinque dense tomentellis, bracteis numerosis cymulas amplectantibus, bracteolis linearibus, floribus majoribus recedit.

Fruticulus ramosus ramulis gracillimis teretiusculis primo albido-tomentellis mox pro maxima parte glabrescentibus. Folia opposita breviter (ad 2–3 mm.) petiolata, plerumque 1.5–2 cm. longa, 5–6 mm. lata, lanceolata vel oblongo-lanceolata obtusa vel subrotundata integra supra obscure viridia dense minute stellato-tomentella, nervis obscuris, infra dense albido- vel fulvido-tomentosa nervis 4–5-paribus paulo elevatis conspicuis. Inflorescentiae ramulos terminantes 6–15-florae; pedunculi pedicellique brevissimi; flores subcapitati; bracteae (folia floralia) basim cymularum obtegentes numerosae ad 1 cm. longae lineares dense fulvido-tomentosae; bracteolae bracteis similes sed multo minores sub calycibus insertae. Calyx tubulosus circ. 7 mm. longus tubo corollae adpressus extus dense fulvido-stellato-tomentosus intus glaber dentibus 2.5 mm. longis anguste lanceolatis acutis. Corollae tubus 11–12 mm. longus, circ. 2 mm. latus, extus dense albido-stellato-tomentosus intus longiuscule albo-pilosus; lobi rotundati circ. 3 mm. diametro extus ± tomentosi intus glabri. Stamina medio tubo inserta. Ovarium circ. 1.5 mm. longum supra albo-pilosulum stylo ovarium aequante. Fructus deest.

"Common on very steep and torrid cliffs and banks of the most torrid loëss region about Kiai chow: descending along the burning walls of the Hei Shui fang, but not extending to Siku. Fl. April 29." Kansu, West China. Farrer and Purdom. No. 14 in Herb. Edin.

This Kansu species closely resembles in habit the Yunnan species *B. nana,* W. W. Sm. The strong development of bracts and bracteoles is noteworthy.

Buddleia taliensis, W. W. Sm. Sp. nov.

Species valde affinis *Buddleiae Forrestii,* Diels a qua calyce dense stellato-tomentoso, dentibus multo brevioribus, ovario parte superiore dense tomentoso, fructu supra tomentoso differt.

Frutex 2–3 m. altus ramulis subteretibus primo incano-tomentellis deinde glabrescentibus rubidis. Folia superiora petiolo 5–10 mm. longo tomentello suffulta, 9–16 cm. longa, 2–4 cm. lata, lanceolata, apice acuminata, basi cuneata, margine crebre serrulata serraturis calloso-apiculatis, chartacea, supra pallido-viridia ± tomentella, subtus dense cinnamomeo-

tomentosa. Inflorescentiae thyrsoideae densiflorae e cymis pedunculatis compositae 4–5 cm. longae rhachi primo dense incano-tomentosa. Flores castaneo-fusci pedicellis 2–3 mm. longis sparse pilosis praediti. Calycis circ. 3 mm. longi tubus dense stellato-tomentosus, dentes ± 1 mm. longi calloso-apiculati. Corolla circ. 1.1 cm. longa; tubus circ. 3 mm. latus, extra parte mediana ± glaber, apicem versus pilosus, intus medio dense pilosus, lobi circ. 2.5 mm. diametro extra pilosi intus glabri. Stamina paulo supra medium tubum affixa. Ovarium infra glabrum supra dense albo-tomentosum ± 2 mm. longum stylo ad 4 mm. longo. Fructus vix maturus ± 5 mm. longus dimidio superiore albo-tomentosus.

"Shrub of 6–9 ft. Flowers deep maroon-crimson. In open scrub on the western flank of the Tali Range, Yunnan. Lat. 25° 40′ N. Alt. 9000 ft. Aug. 1913." G. Forrest. No. 11,561.

Closely akin to *Buddleia Forrestii*, Diels, but differing in the tomentose ovary and fruit. The pilosity of leaf, calyx, and ovary is at times a very uncertain character in the genus *Buddleia*; the three species, *Forrestii*, *limitanea*, and *taliensis*, are easily separable from the characters given, yet they form a very closely allied series and intermediates between them may yet be found.

Buxus microphylla, Sieb. et Zucc., var. **rupicola,** W. W. Sm. Var. nov.

Fruticulus ± 1 m. altus ramulis densissime fulvido-pilosulis. Folia lanceolata, apice obtusa haud emarginata, 1–1.5 cm. longa, 4–6 mm. lata, pallido-viridia supra opaca haud nitida minute furfuracea vel pilosula tandem glabra, subtus ad costam pilosula vel glabrata, margine juventute minute ciliolata, utrinque nervis siccitate obscuris; petioli densissime pilosuli.

"Shrub of 2–3 ft. Open situations amongst rocks on the Kari Pass, Mekong-Yangtze divide, Yunnan. Lat. 27° 40′ N. Alt. 12,000 ft. Aug. 1914." G. Forrest. No. 13,075.

This differs from the other varieties of *B. microphylla* in the densely pilose branchlets and small lanceolate leaves; the leaf surfaces are dull and not shining, and the veins obscure on both sides.

Calamintha barosma, W. W. Sm.

Species ex affinitate *C. longicaulis*, Benth. a qua ex descriptione foliis minimis glabrescentibus, verticillastris 1–2-floris, calyce epiloso differt.

Planta diffusa multicaulis basi suffruticosa. Caules decum-

bentes vel subdecumbentes flexiles filiformes 20–40 cm. longi ramosi ± dense albo-pilosuli. Folia 4–6 mm. longa, 2–3 mm. lata, lanceolata vel oblanceolata, apice obtusiuscula, basi in petiolum pilosulum vel glabratum ± 1 mm. longum cuneata, integerrima, utrinque epilosa vel (in eodem specimine) pilosula. Inflorescentia terminalis spiciformis gracilis ex verticillastris 3–7 approximatis vulgo 1–2-floris composita 3–5 cm. longa; bracteae foliis similes; bracteolae lineares ± 2 mm. longae pedicellos pilosulos subaequantes. Calyx tubulosus circ. 9 mm. longus dentibus linearibus ± 1 mm. longis subaequalibus rectis praeditus 13-nervius epilosus nisi ad angulos dentium longiuscule albo-pilosos, nitenti-glandulosus. Corolla circ. 1.7 cm. longa laete rosea; tubus rectus longiuscule exsertus circ. 1.4 cm. longus extus dense albo-pilosulus intus sparse pilosulus; limbus bilabiatus labio postico emarginato, antico 3-fido lobis subaequalibus. Stamina vix exserta.

"Shrubby tufted plant of 9–15 inches. Powerfully aromatic. Flowers bright rose. Stony pasture and on ledges of limestone cliffs on the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 12,000 ft. July 1913." G. Forrest. No. 10,371.

Also cultivated in the Royal Botanic Garden, Edinburgh, where it flowered September 1915.

This species is very different from any Chinese *Calamintha* and appears to be closely akin to the Nepalese *C. longicaulis*, Benth. which I have not seen. Like the latter, it has a calyx with subequal teeth; this and the entire leaves bring it near to the genus *Micromeria*.

Calamintha euosma, W. W. Sm. Sp. nov.

Species valde affinis *C. barosmati*, W. W. Sm., fortasse varietas rectius aestimanda sed foliis majoribus obscure crenulatis, inflorescentiis laxioribus, cymulis plerumque 3–5-floris longiuscule pedunculatis, calyce extus patenti-pilosulo, dentibus haud aequalibus, corolla minore, tubo calycem paululo superante recedit.

Planta multicaulis basi lignosa habitu speciei supra citatae. Caules 15–30 cm. longi. Folia ad 2 cm. longa, ad 1.2 cm. lata, ovata, apice obtusa vel rotundata, basi in petiolum pilosulum ± 3 mm. longum cuneata, obscure remote crenulata, utrinque glabrata. Inflorescentia terminalis ex verticillastris 3–7 subremotis plerumque 3–5-floris composita; cymulae pedunculis ± 1 cm. longis glanduloso-pilosis suffultae; bracteae bracteolaeque speciei praecedentis. Calyx tubulosus 4–6 mm. longus dentibus linearibus ± 1 mm. longis inaequalibus praeditus 13-nervius glanduloso-pilosulus, ad angulos dentium longiuscule albo-

pilosus. Corolla ± 1 cm. longa saturate rosea; tubus rectus paululo exsertus; caeterum speciei praecedenti subsimilis.

"Tufted shrubby plant of 6–12 inches. Strongly aromatic. Flowers deep rose. Open limy pasture in the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 11,000 ft. July 1913." G. Forrest. No. 10,574.

Closely akin to the preceding species, but with several points of divergence—larger obscurely crenulate leaves, laxer inflorescence, peduncled cymes usually 3–5-flowered, pilose smaller calyx with unequal teeth and a smaller corolla.

Callianthemum Farreri, W. W. Sm. Sp. nov.

Species nana affinis *C. coriandrifolio*, Reichb. a quo foliis omnibus radicalibus petalis caeruleis inter alia signa recedit.

Rhizoma horizontale vel obliquum. Caulis solitarius tempore florendi 4–5 cm. altus, simplex uniflorus folia longe superans. Folia sub anthesin vix explicata omnia radicalia, plerumque duo, petiolo circ. 1 cm. longo vagina lata praedito suffulta; lamina ambitu ovata glabra ± 1 cm. longa, vix 1 cm. lata bipinnata pinnarum paribus 2 et extrema pinna impari; pinnulae late cuneatae trilobatae segmentis ultimis oblanceolatis obtusis. Flos 2.5–3 cm. diametro caeruleus. Sepala 5 fere 1 cm. longa obovata vel suborbicularia, siccitate pallido-viridia vel albida. Petala 8–9, anguste obovata vel oblanceolata circ. 1.5 cm. longa ad 6 mm. lata haud emarginata lineis purpureis bene notata. Carpella ± 12 glabra. Fructus desunt.

"On cool peaty ledges of the Satanee range, 8000–10,000 ft. Flowers 6th–15th May. Probably the same species abounds in the high fine shingles of the Bei Ling and Thundercrown; Kansu, West China." Farrer and Purdom. No. 70.

A beautiful dwarf species akin to *Callianthemum coriandrifolium*, Reichb. and its Asiatic allies.

Capparis subtenera, Craib et W. W. Sm. Sp. nov.

Species affinis *C. tenerae*, Dalz. sub qua antehac planta posita est sed foliis majoribus crassioribus primo furfuraceo-puberulis nec glabris, aculeis variabilibus rectis vel apice paululo decurvatis nunquam omnino decurvis, floribus numerosioribus multo majoribus supra axillam quamque usque ad 5 enatis, ovario breviter apiculato recedit; *C. disticha*, Kurz quae est affinis potius ad *C. teneram*, Dalz. quoad flores spinasque spectat.

Frutex 2–10 m. altus semiscandens ramulis primo minute puberulis tandem glabrescentibus. Folia 4–12 cm. longa, 2–5 cm. lata, ovato-oblonga vel ovato-lanceolata vel lanceolata, apice obtusiuscula vel acuta vel breviter acuminata, basi

rotundata vel late cuneata, integra papyracea utrinque primo furfuraceo-puberula, tandem glabra; petioli ± 1 cm. longi. Aculei 2–3 mm. longi recti vel apice paululo decurvati. Flores supra-axillares, plerumque 3–5 superpositi pedicellis 1.5–2 cm. longis puberulis suffulti. Sepala 4, circ. 7 mm. longa, ± 3 mm. lata, elliptica puberula, tandem deflexa. Petala 1–1.2 cm. longa, ± 3 mm. lata, lineari-oblonga obtusa ± tomentella. Stamina circ. 16 fere 3 cm. longa. Gynophorum circ. 3 cm. longum filiforme. Ovarium ± 1.5 mm. longum ovoideum breviter apiculatum glabrum. Bacca globosa ± 1 cm. diametro nigra vulgo ± 8-seminifera. *Capparis tenera*, Diels vix Dalz. in Notes R.B.G. Edin., v (1912), 90.

China :—" Semi-scandent spinous shrub of 10–20 ft. Flowers transparent purplish-white. On trees in shady open situations in the Teng-chuan-cho Valley, Yunnan. Lat. 26° N. Alt. 7000 ft. April 1906." G. Forrest. No. 2028.

" Shrub of 6–18 ft. Flowers dull transparent lavender-grey. Amongst scrub on lava-bed to west of Tengyueh. Lat. 25° N. Alt. 5000 ft. May 1912." G. Forrest. No. 7589.

" Shrub of 4–15 ft. In fruit. Amongst scrub in the Shweli Valley, Yunnan. Lat. 25° N. Alt. 5000–6000 ft. June–July 1912." G. Forrest. Nos. 8077, 8593.

" Shrub of 6–15 ft. Flowers dull bluey-grey. Open pasture and in thickets on the hills west of Tengyueh. Lat. 25° N. Alt. 5000–6000 ft. March 1913." G. Forrest. No. 9721.

Chiyuan, Yunnan; shrub 10 ft., white flowers. Henry. No. 9124B.

Mengtze woods, 4600 ft.; shrub 5–10 ft.; black fruit. Henry. No. 9124A. Also Henry, No. 9124C, white flowers.

Valley of Lan-ngi-tsin, Yunnan; large spiny shrub with branches, spines, and persistent leaves of a shining green. E. E. Maire. No. 168 in Herb. Edin. Also Maire, Nos. 106, 593, 1708.

Burma :—" Shrub of 20–30 ft. Flowers dull, transparent white. Open situations in the Taping Valley. Lat. 24° 20′ N. Alt. 2000 ft. Feb. 1913." G. Forrest. No. 9654.

Capparis yunnanensis, Craib et W. W. Sm. Sp. nov.

Species affinis *C. Roxburghii*, DC. quae alabastris glabris inter alia differt; a *C. formosana*, Hemsl. et *C. Cleghornii*, Dunn foliis diversis et floribus majoribus recedit.

Frutex alte scandens (ex *Henry*) ramulis dense fulvo-tomentellis. Folia (superiora tantum visa) usque ad 10 cm. longa, ad 5 cm. lata, elliptico-lanceolata, apice rotundata vel ± obtusa, basi rotundata vel late cuneata, integra papyracea, utrinque parcissime puberula siccitate supra atroviridia nervis obscuris, infra brunnea nervis 7–8-paribus paulo eminentibus ± conspicuis;

petioli ± 1 cm. longi fulvo-tomentelli ; aculei (saltem in scheda nostra) desunt. Inflorescentiae terminales atque axillares ; corymbi pedunculis 5–6 cm. longis tomentellis suffulti 4–7-flori ; flores inter majores pedicellis 2–4 cm. longis tomentellis praediti. Sepala 4, orbicularia, 1.5–1.7 cm. diametro, extra dense minute fulvo-tomentella. Petala late obovata fere 2 cm. longa, apicem versus circ. 1.5 cm. lata, intus tomentella. Stamina plurima. Gynophorum 3–3.5 cm. longum glabrum. Ovarium ± 3 mm. longum ovoideum breviter apiculatum glabrum. Fructus deest. *C. Roxburghii,* Dunn, vix DC. in Journ. Linn. Soc., xxix (1911), 426.

Szemao, Yunnan, S.W. forests, at 4000 ft. ; large climber. A. Henry. No. 12,986.

6270

Chelonopsis bracteata, W. W. Sm. Sp. nov.

Species affinis *C. lichiangensi,* W. W. Sm. ; quoad habitum foliaque valde appropinquat, quoad bracteas conspicuas, calycem, corollam distincte divergit.

Fruticulus 2–3 m. altus. Rami robusti patenti-setosi atque glanduloso-pilosuli. Folia petiolo 4–6 cm. longo robusto suffulta ; lamina 10–15 cm. longa, 6–8 cm. lata, lanceolato-ovata plus minusve acuminata basi brevi-cordata crenato-serrata serraturis apice callosis chartacea supra sparse setosa ad costam albo-pilosula infra parcissime setosa, nervis 5–6-paribus siccando satis distinctis. Inflorescentiae axillares, 1–2-natae e cymulis 3–7-floris compositae ; pedunculi 3–4 cm. longi ; pedicelli sub anthesin breves 2–5 mm. longi setosi atque glandulosi ; bracteae conspicuae usque ad 2.5 cm. longae lanceolatae foliaceae setosae virides vel rubescentes prope calycem insertae atque cymulam prima aetate velantes. Calyx circ. 1.8 cm. longus 10-nervius setosus atque glandulosus rubescens ; dentes triangulares 6–7 mm. longi subaequales apiculo 2–3 mm. longo praediti. Corolla ± 3 cm. longa, apud fauces 1–1.3 cm. lata, subglabra saturate rosea ; limbus ei *C. lichiangensis* subsimilis ; stamina stylusque itidem.

"Shrub of 6–9 ft. Flowers deep rose. Open situations amongst scrub on the Tong Shan in the Yangtze bend, Yunnan. Lat. 27° 20′ N. Alt. 8000 ft. Sept. 1913." G. Forrest. No. 11,408.

This is readily distinguished from the allied *C. lichiangensis* by the large bracts enclosing the cymes, by the more deeply cleft calyx, and by the deep-rose, almost glabrous, corolla.

6268

Chelonopsis lichiangensis, W. W. Sm. Sp. nov.

Species affinis *C. roseae,* W. W. Sm. sed caulibus densissime setosis, foliis majoribus, cymis longiuscule pedunculatis, floribus flavis inter alia dignoscitur.

Fruticulus 1–3 m. altus. Rami robusti dense patenti-fulvido-setosi atque glanduloso-pilosuli. Folia petiolo 3–5 cm. longo robusto setoso atque glanduloso-pilosulo suffulta; lamina 8–12 cm. longa, 6–7 cm. lata, ovata plus minusve acuminata basi breviter vel vix cordata grosse serrata serraturis apice callosis, chartacea supra subsparse setosa, infra ad costam nervosque venulasque setosula atque pilosula, nervis utrinque 5–6-paribus infra eminentibus. Inflorescentiae axillares 1–2-natae e cymulis plerumque 3-floris compositae; pedunculi ± 5 cm. longi setosi atque glanduloso-pilosi, ut pedicelli in fructu ad 2.5 cm. longi; bracteae sublineares 1–2 cm. longae pilosae. Calyx ± 15 mm. longus campanulatus 10-nervius glanduloso-pilosus viridis, fructu ampliatus; dentes ovato-triangulares calloso-apiculati ± 5 mm. longi subaequales margine ciliati. Corolla ± 3 cm. longa, ad fauces ± 1 cm. lata, extus dense pilosula flava; limbi labium superius brevissime emarginatum circ. 5 mm. latum, longitudine vix 1.5 mm. superans; labii inferioris lobi laterales circ. 3 mm. longi, medianus 4–5 mm. longus breviter emarginatus. Stamina 4 filamentis pilosulis, antheris ciliatis. Stylus bifidus lobis subaequalibus.

"Shrub of 4–8 ft. Flowers yellow. In open situations in the valley of the Yangtze, east of the Lichiang Valley, Yunnan. Lat. 27° 45′ N. Alt. 6000 ft. July 1913." G. Forrest. No. 10,512.

6262 **Chelonopsis rosea,** W. W. Sm. Sp. nov.

Species affinis *C. odontocheilae,* Diels sed caulibus petiolisque densissime pilosis floribus saturate roseis nec flavis inter alia differt.

Fruticulus 1–2 m. altus. Rami robusti densissime pilosi. Folia petiolo 1.5–2 cm. longo robusto suffulta; lamina ± 5.5 cm. longa, ± 3.5 cm. lata ovata breviter acuminata basi cordatula serrata serraturis callosis, chartacea, supra subaeque infra praesertim ad costam nervosque pilosa. Inflorescentiae axillares cymulis plerumque 3-floris compositae; pedunculi pedicelli bracteae densissime pilosi. Calyx ± 10 mm. longus campanulatus 10-nervius ± dense pilosus rubridus, fructu ampliatus; dentes triangulares apiculati ± 2 mm. longi subaequales. Corolla ± 3 cm. longa, 8–10 mm. lata, extus dense pilosa, saturate rosea; limbi brevis labium superius circ. 3 mm. longum, vix emarginatum; labii inferioris lobi laterales circ. 3 mm. diametro, medianus ± 5 mm. longus margine haud dentatus.

"Aromatic shrub of 4–6 ft. Flowers deep dull rose. Open situations amongst boulders in side valleys on the Tali Range, Yunnan. Lat. 25° 40′ N. Alt. 10,000 ft. Aug. 1913." G. Forrest. No. 11,682.

Akin to *C. odontocheila,* Diels, but with shorter stouter petioles, much more pilose leaves and inflorescence, corolla dull rose and not yellow, and an entire or subentire middle lobe to the lower lip.

6269 **Chelonopsis siccanea,** W. W. Sm. Sp. nov.

Species affinis *C. roseae,* W. W. Sm. et *C. bracteatae,* W. W. Sm.; ab hac bractearum magnarum absentia, calycis lobis inter alia divergit, ab illa foliis glabrioribus, petiolis longioribus glandulosis praeter alia signa dignoscitur.

Fruticulus 1–2 m. altus. Rami graciles pilosi supra capillis parvis glanduloso-capitatis ± dense praediti. Folia petiolo 2.5–4 cm. longo sparse piloso atque dense glanduloso-pilosulo suffulta; lamina 6–8 cm. longa, 3–4 cm. lata, ovata vel ovato-lanceolata apice acuminata, basi cordatula, crenato-serrata serraturis breviter calloso-apiculatis, siccando membranacea, supra sparse pilosa, ad serraturas ciliata, infra ad costam nervosque sparse pilosa, cetera glabra vel glabrescens. Inflorescentiae axillares cymulis plerumque 3-floris compositae; pedunculi ad 2.5 cm. longi glandulosi saepe sparse pilosi; pedicelli 2–3 mm. longi glandulosi; bracteae 5–10 mm. longae lineares pilosae. Calyx 1–1.5 cm. longus sparse pilosulus basi glandulosus, dentes triangulares 3–4 mm. longi breviter apiculati. Corolla ± 3 cm. longa, ad fauces in sicco circ. 1 cm. lata, infra subglabra supra pilosula saturate purpureo-rosea; limbi brevis labium superius circ. 3 mm. longum haud emarginatum; labii inferioris lobi laterales rotundati, medianus late oblongus longiuscule protrusus 1 cm. paulo superans. Staminum filamenta glabra, antherae ciliatae. Stylus bifidus glaber.

"Shrub of 4–6 ft. Flowers deep purple-rose. Dry situations amongst scrub on the Yungning-Yangtze divide, Yunnan. Lat. 27° 40′ N. Alt. 9000 ft. July 1914." G. Forrest. No. 13,082.

2075 **Chirita orbicularis,** W. W. Sm. Sp. nov.

Species ex affinitate *C. speciosae,* Kurz, *C. brevipedis,* C. B. Clarke et *C. Traillianae,* G. Forrest et W. W. Sm. sed foliis orbicularibus supra albo-setoso-lanatis, pedunculis elongatis unifloris ebracteatis divergit.

Planta subacaulis. Caulis repens abbreviatus pilis articulatis dense ferrugineo-hirsutus. Folia radicalia 4–5, petiolo 2–3.5 cm. longo dense fulvo- vel ferrugineo-hirsuto suffulta; lamina orbicularis vel suborbicularis 4–8 cm. diametro apice rotundata acumine nullo, basi brevissime inaequaliter cordatula margine obtuse crenato-serrata supra viridis pilis longiusculis articulatis

dense incano-pilosa infra pallidior setis albidis praesertim ad costam nervosque modice praedita, nervis 3–4-paribus vix eminentibus. Pedunculi quasi radicales 1–3, albo-setosi primo breves tandem ad 10 cm. elongati uniflori; bracteae nullae. Calyx tubulosus 2 cm. longus vel paulo longior basi dense supra sparse albo-setosus nunc ad medium nunc ad quartam partem in lobos 5 triangulos vel lanceolatos glanduloso-acuminatos fissus. Corolla tubuloso-infundibularis ± 5 cm. longa extus glabra; tubus ad 4 cm. longus apice medioque in sicco 1.2–1.5 cm. latus extus basi albidus supra pallide purpureo-coeruleus, intus ad partem anteriorem flavido-lineatus; lobi rotundati circ. 1.5 cm. diametro laete purpureo-coerulei glabri. Stamina perfecta 2 raro 4 infra medium tubum inserta filamentis supra pilosulis ceteroqui ut in *C. Trailliana*. Ovarium lineare minute pilosulum. Capsula linearis ad 12 cm longa.

"Plant of 3–9 inches. Flowers bright purplish-blue. Shady humus-covered boulders by streams in the Yang-pi Mountains, Yunnan. Lat. 26° 45′ N. Alt. 9000 ft. Aug. 1913." G. Forrest. No. 10,923.

A species very closely allied to *C. Trailliana*, G. Forrest et W. W. Sm., but with different leaves, solitary flowers and no bracts on the peduncle. In the structure of the flower and its colouring it is very near its ally.

2026 **Chirita Trailliana,** G. Forrest et W. W. Sm. Sp. nov.

Species valde affinis *C. speciosae*, Kurz, sed foliis apice rotundatis nec acutis subtus purpureis pedunculis paucifloris recedit.

Planta fere acaulis. Caulis repens abbreviatus pilis articulatis dense ferrugineo-hirsutus. Folia radicalia vel subradicalia opposita 3–5, in speciminibus cultis numerosa, petiolo usque ad 15 cm. longo pilis articulatis dense ferrugineo-hirsuto suffulta; lamina 8–20 cm. longa 6–15 cm. lata, late ovata vel suborbicularis apice rotundata basi subaequaliter vel valde oblique cordata margine obtusiuscule crenato-serrata supra atroviridis pilis articulatis pallidis ± densiuscule pilosa infra purpurea vel purpurascens vel purpureo-marmorata ad costam nervosque virides densissime fulvo-setoso-pilosa ceteroquin sparse pilosa, in vivo carnosula rugosa, nervis 5–8 paribus supra impressis infra valde eminentibus bene reticulatis. Pedunculi quasi radicales plerumque 2–3, dense ferrugineo-hirsuti primo breves tandem elongati 6–12 cm. longi 1–4-flori; pedicelli 1–2 cm. longi cum bracteis ± 1 cm. longis lanceolatis vel ovatis ferrugineo-hirsuti. Calyx tubulosus 1.5–2.5 cm. longus ferrugineo-hirsutus plus minusve ad medium in lobos 5 triangulares vel lanceolatos acuminatos fissus. Corolla tubuloso-infundibularis 5–6 cm.

longa extus ± crebre setaceo-pilosula ; tubus ad 4.5 cm. longus apice medioque 1.5–1.7 cm. latus extus basi albidus supra pallide purpureo-coeruleus, intus ad partem anteriorem lineis flavidis circ. 3 cm. longis 1 mm. latis parallelis pulchre notatus, glaber, ad partem posteriorem hic illic pilosulus ; lobi rotundati 1.2–1.5 cm. diametro anteriores paulo majores, extus albidi intus laete purpureo-coerulei, margine sparse ciliolati, ceteroqui glabri. Stamina perfecta 2 infra medium tubum inserta filamentis albis glabris circ. 1.5 cm. longis medio gibboso-incrassatis torsis complanatis basi incrassatis ; antherae cohaerentes circ. 5 mm. longae connectivis albo-lanatis ; staminodia duo circ. 1 cm. longa filamentis albo-lanatis. Discus annularis. Ovarium lineare cum stylo fere 3.5 cm. longum nigrido-pilosulum ; stigma unilaterale alte bifidum lobis subquadratis ± 4 mm. longis. Capsula linearis usque ad 9 cm. longa.

" Plant of 2–4 inches. Flowers bright purplish-blue. Moist shady situations on ledges of cliffs and humus-coloured boulders in the Shweli valley, Yunnan. Lat. 25° N. Alt. 5000–6000 ft. May 1912." G. Forrest. No. 7976.

" Plant of 6–10 inches. Flowers purplish-blue ; under surface of foliage purplish-red. Ledges of cliffs and on rocks in shady situations in the hills to the south of Tengyueh, Yunnan. Lat. 25° N. Alt. 6000–7000 ft. June 1912." G. Forrest. No. 8124.

A very beautiful species with large flowers and with leaves of a fine purple below. It is now in cultivation from seeds obtained by George Forrest in Yunnan for Mr. J. C. Williams of Caerhays Castle, Cornwall. In specimens which have flowered the corolla is quite two inches long ; the tube outside is a light purplish-blue, the rounded lobes are whitish outside, and a fine bright purplish-blue inside, the tube inside on the anterior side is marked with two narrow parallel lines of yellow over an inch long.

1530 **Colquhounia compta,** W. W. Sm. Sp. nov.

Species affinis *C. coccineae,* Wall. a qua calyce inter alia distinguitur.

Fruticulus 1–2 m. altus, erectus ramosus. Rami subteretes primo densissime incano-tomentelli pilis stellatis simplicibusque intermixtis, vetustiores cinerascentes decorticantes. Folia petiolo plerumque 1–1.5 cm. longo dense tomentoso suffulta ; lamina plerumque 4–5.5 cm. longa, 3–4 cm. lata, ovata subacuta basi ± rotundata crenata chartacea supra viridis ± dense tomentosa infra densissime incano-tomentosa. Cymulae axillares pedunculis ad 1 cm. longis suffultae pauciflorae, pedicelli 2–3 mm. longi. Calyx tubuloso-campanulatus ± 1 cm. longus extus

dense stellato-tomentosus dentibus subaequalibus ± 4 mm. longis triangularibus acutis. Corolla usque ad 3 cm. longa incurva obscuro-kermesina extus puberula ; tubus basi angusta supra ampliatus 2 cm. longus vel ultro ; labium superius ellipticum apice rotundatum 6–7 mm. longum, inferius tripartitum segmentis subaequalibus. Stamina e tubo exserta lobos haud superantia. Styli rami parum inaequales.

"Shrub of 4–6 ft. Flowers dull greyish-crimson. Open dry situations amongst scrub in the Mekong Valley, Yunnan. Lat. 28° 10′ N. Alt. 6000–7000 ft. Sept. 1914." G. Forrest. No. 13,405.

An ally of *C. coccinea*, Wall., from which it is most easily distinguished by the calyx and its teeth.

6534 **Colquhounia mekongensis**, W. W. Sm.

Species peraffinis *C. comptae*, W. W. Sm. a qua floribus majoribus, calycis dentibus longioribus angustioribus inter alia signa recedit.

Fruticulus 1.5–2 m. altus erectus. Rami subteretes primo densissime incano-tomentelli pilis stellatis simplicibusque intermixtis, tandem cinerascentes. Folia petiolo ± 1 cm. longo dense tomentoso suffulta ; lamina plerumque 3–4 cm. longa, 2.5–3 cm. lata ovata acuta vel obtusiuscula, basi ± rotundata crenata chartacea supra viridis dense pilosa infra densissime incano-tomentosa. Cymulae axillares pedunculis ± 5 mm. longis suffultae pauciflorae ; pedicelli 1–2 mm. longi. Calyx tubuloso-campanulatus circ. 1.1 cm. longus extus dense stellato-tomentosus dentibus subaequalibus ± 5 mm. longis sublinearibus acutis. Corolla usque ad 3.5 cm. longa recta saturate rosea extus puberula ; tubus basi angusta supra ampliatus circ. 2.3 cm. longus ; labium superius ellipticum brevissime emarginatum, 1 cm. superans, inferius tripartitum segmento mediano lateralibus longiore. Stamina e tubo exserta lobos fere aequantia. Rami styli subaequales.

"Shrub of 4–5 ft. Flowers deep magenta-rose. Open dry situations in the Mekong Valley, Yunnan. Lat. 28° N. Alt. 6000 ft. Sept. 1914." G. Forrest. No. 13,265.

Very close to *C. compta*, but differing in the shape of both calyx and corolla.

1047 **Corydalis atuntsuensis**, W. W. Sm. Sp. nov.

Species ex affinitate *C. oxypetalae*, Franch. et *C. pachycentrae*, Franch. sed inter alia bracteis flabellato-partitis dignoscenda.

Radix e fibris fusiformibus composita eis specierum supra citatarum persimilis collo vestigiis petiolorum praeteritorum

cincta. Caules 2–3-nati usque ad 8 cm. longi debiles flexuosi decumbentes plerumque bifoliati glabri. Folia radicalia 1–2, petiolo circ. 6 cm. longo debili praedita; lamina (haud bene representata) circ. 1.5 cm. longa pinnata segmentis 5–7 linearilanceolatis integris 5–10 mm. longis glabris; folia caulina plerumque duo opposita vel subopposita paulo supra medium caulem inserta fere sessilia ceteroqui radicalibus subsimilia segmentis usque ad 1.5 cm. longis. Racemi terminales laxi circ. 4 cm. longi, 4–12-flori; bracteae ambitu obovatae 7–8 mm. longae in lobos 5–7 lineares flabellato-partitae glabrae; pedicelli bracteas subaequantes vel eis duplo longiores. Flores ex speciminibus siccis verisimiliter coerulei. Sepala squamiformia circ. 1 mm. diametro denticulata. Petalum posticum cristatum apice galeatum cum calcare fere 2 cm. longum; calcar ± 1 cm. longum limbo paululo longius modice aduncum apice obtusum; petalum anticum cristatum postico subaequale; petala interiora paululo breviora cristatula. Capsula immatura linearis.

"N.W. Yunnan. Near Atuntsu, 15,000–16,000 ft." Kingdon Ward. No. 60.

A dwarf species smaller than the allied *C. pachycentra*, Franch. from which the bracts serve at once to distinguish it.

1048 **Corydalis benecincta,** W. W. Sm. Sp. nov.

Species alpina optime distincta; inter species yunnanenses foliis trifoliolatis foliolis integris, bracteis praemagnis quasiverticillatis atque involucrantibus, pedicellis longis multo complanatis, floribus subumbellatis inter alia bene notata.

Radix tuberosa crassa infra ramosa collo vestigiis exiguis petiolorum praeteritorum obsita. Caulis pars inferior fere nuda flexuosa subterranea vel inter saxa errans foliis radicalibus diu delapsis foliis inferiori-caulinis paucis squamiformibus; pars epigaea brevis 1–5 cm. longa plus minusve complanata glabra inflorescentia aequilonga terminata. Folia superiora 2–3, alterna (in situ naturali quasi-subradicalia) petiolo 5–7 cm. longo complanato glabro praedita, trifoliolata; foliola ± 3 cm. longa ± 2 cm. lata, late elliptica vel ovata vel obovata petiolulo nullo vel brevissimo in foliolo mediano nonnunquam paululo elongato praedita apice rotundata vel obtusa basi rotundata vel late cuneata integerrima carnosula utrinque glabra supra laete viridia infra pallidiora. Inflorescentiae plures densae caulem ramulosque terminantes; bracteae 4 vel plures magnae 2–4.5 cm. longae foliaceae lanceolatae vel oblanceolatae approximatae quasi involucrum formantes; flores plerumque 5–6 in quoque racemulo ita approximati ut subumbellati videantur, pedicellis usque ad 4 cm. longis multo complanatis suffulti. Sepala squamiformia ovata vel suborbicularia circ. 2 mm. diametro

denticulata. Petalum posticum apice fornicatum dorso distincte cristatum cum calcare 1.8–2.5 cm. longum ; calcar usque ad 1.2 cm. longum limbum subaequans 3–7 mm. (in sicco) latum ± falcatum apice rotundatum ; petalum anticum cristatum postico subaequale apicem versus usque ad 6–8 mm. latum ; petala interiora apice cohaerentia circ. 9 mm. longa dorso cristata. Capsula vix matura ellipsoidea circ. 7 mm. longa circ. 3 mm. lata stylo 2–3 mm. longo coronata.

" N.W. Yunnan. Near Atuntsu, 15,000–16,000 ft. A scree plant with close tufted habit, fleshy leaves, bulbous root ; July 1911." Kingdon Ward. Nos. 58, 61 ; " flowers crimson, Aug. 1913." No. 965.

A very peculiar species with leaves somewhat suggesting *Trifolium pratense*, Linn., with large bracts which are so approximate as to simulate an involucre, with very long and much flattened pedicels, and with an abnormally large and broad spur.

1049 **Corydalis eccremocarpa,** W. W. Sm. Sp. nov.

Species affinis *C. taliensi,* Franch. a qua inter alia floribus minoribus luteis differt.

Planta 20–30 cm. alta radicibus fibrosis, diffusa e basi multicaulis. Caules 10–20, ramosi remote foliosi. Folia basilaria et caulina similia petiolo 3–4 cm. longo suffulta, longiuscule et latiuscule vaginata ; lamina ambitu oblongo-ovata 2–3 cm. longa biternatisecta segmentis ovatis obtuse lobulatis. Racemi simplices remotiflori ; bracteae inferiores nonnunquam trilobatae, superiores integrae spathulatae ± 5 mm. longae pedicellos subaequantes ; flores lutei apice purpureo-tincti circ. 1.5 cm. longi. Sepala ovata circ. 2 mm. longa erosa albida subpersistentia. Petalum superius circ. 7 mm. longum brevissime vel vix cristatum, petalum inferius aequilongum breviter carinatum ; calcar circ. 8 mm. longum gracile haud curvatum acutiusculum. Capsula fere 2 cm. longa linearis sub maturitatem pendula stylo persistente. Semina ± 12 nigra nitentia sub lente valido minute areolata.

" Plant of 9–12 inches. Flowers yellow, tipped purple. Open stony pasture on the Tong Shan in the Yangtze bend, Yunnan. Lat. 27° 20′ N. Alt. 10,000 ft. Aug. 1913." G. Forrest. No. 10,839.

1050 **Corydalis fluminicola,** W. W. Sm. Sp. nov.

Species alpina fere aquatica ex affinitate *C. Stracheyi,* Duthie.

Radices multae fibrosae carnosulae nec tuberosae nec incrassatae. Caules plerumque 2–3-nati 12–20 cm. longi debiles flexuosi decumbentes sat foliosi glabri. Folia radicalia 4–6,

petiolo 5–6 cm. longo multum complanato glabro praedita; lamina ambitu oblonga 5–8 cm. longa circ. 2 cm. lata, bipinnata segmentis pinnatifidis lobulis ultimis lanceolatis acutiusculis carnosula utrinque glabra supra laete viridis infra glaucescens; folia caulina 5–6 vel plura, mediana radicalibus minora petiolo lato subvaginanti suffulta, suprema multo minora, ceteroqui omnia radicalibus subsimilia. Racemi terminales spiciformes circ. 4 cm. longi circ. 3 cm. lati floribus plurimis multo congestis; bracteae obovatae vel oblanceolatae circ. 4 mm. longae margine minutissime denticulatae glabrae; pedicelli breves bracteis breviores eisque celatae. Flores mediocres in sicco lutei, corolla apice brunnea. Sepala squamiformia ambitu suborbicularia, pro petalis in hoc genere magna, circ. 2.5 mm. diametro margine grosse irregulariterque erosa. Petalum posticum apice galeatum dorso alte cristatum cum calcare 1.7 cm. longum; calcar usque ad 7 mm. longum limbo distincte brevius multo aduncum apice obtusum; petalum anticum alte cristatum postico subaequale apicem versus circ. 3 mm. latum; petala interiora exterioribus paululo breviora cristata epidermide (brunneo-maculata in sicco) facile separabili praedita. Capsula immatura linearis.

"N.W. Yunnan. Near Atuntsu, 14,000 ft. July 1911. An aquatic alpine growing in the upper streams." Kingdon Ward. No. 59.

Corydalis Wardii, W. W. Sm. Sp. nov.

Species affinis *C. homopetalae,* Diels; foliis racemisque densifloris divergit, fructu appropinquat.

Radices multae fibrosae carnosulae vix incrassatae. Caules plerumque 2–3-nati 15–24 cm. longi flaccidi flexuosi decumbentes simplices vel parce ramosi sparse foliosi glabri. Folia radicalia 2–3, petiolo 4–5 cm. longo debili praedita; lamina ambitu ovata vel ovato-oblonga 2–3 cm. longa circ. 2 cm. lata bipinnata segmentis pinnatifidis vel lobatis lobulis ultimis anguste lanceolatis acutis ± 3 mm. longis, supra obscure viridis infra glaucescens; folia caulina 3–6 petiolo breviori suffulta ceteroqui radicalibus subsimilia, suprema multo reducta. Racemi terminales modice densiflori 4–6 cm. longi circ. 2.5 cm. lati; bracteae ambitu obovatae 4–7 mm. longae pinnatifidae vel 3–7-partitae in lobos lineares, supremae lanceolatae integrae vel subintegrae; pedicelli usque ad 5 mm. longi bracteis breviores vel subaequantes. Flores mediocres circ. 2 cm. longi flavidi (?) apice in sicco brunnei. Sepala squamiformia perlate ovata circ. 1.5 mm. longa, 2 mm. lata grosse erosa. Petalum posticum apice galeatum dorso alte cristatum crista crenulata cum calcare circ. 2 cm. longum; calcar usque ad 1.1 cm. longum limbo paulo longius gracile

modice curvatum apice obtusiusculum ; petalum anticum alte cristatum postico subaequale ; petala interiora paulo breviora. Capsula immatura ellipsoidea circ. 3 mm. longa ; stylus 4 mm. longus.

" N.W. Yunnan. Near Atuntsu, elevation 12,000–14,000 ft. July 1911." Kingdon Ward. Nos. 63, 64.

Cotinus nana, W. W. Sm. Sp. nov.

Species affinis *C. Coggygriae,* Scop. sed habitu nano, foliis minimis coriaceis, floribus kermesinis recedit.

Fruticulus .5–1.5 m. altus ramosus ; ramuli juniores teretes subglauci vel rubescentes glabri, vetustiores cinerei. Folia alterna petiolo vix 3 mm. superante epiloso glauco suffulta ; lamina usque ad 1 cm. longa, 8–9 mm. lata, suborbicularis apice basique rotundata vel obtusissima, coriacea integerrima utrinque epilosa supra viridis infra cereo-glauca. Flores parvi in cymas compositas paniculam pro planta amplam efformantes dispositi ; ramuli inflorescentiarum pernumerosi pilis glanduloso-capitatis dense induti ; bracteae vix 1 mm. superantes subulatae ; pedicelli 5–10 mm. longi glanduloso-pilosi. Sepala ± 1 mm. longa, triangularia acuta. Petala circ. 2 mm. longa, oblongo-elliptica ex collectore kermesina. Stamina 5 sepalis paulo longiora, antheris filamenta subaequantibus. Flores hermaphroditi vel feminei desunt.

" Shrub of $1\frac{1}{2}$–4 ft. Flowers crimson. Open dry situations in the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 10,000–11,000 ft. July 1913." G. Forrest. No. 10,336.

A very beautiful little shrub, distinguished from its ally *C. Coggygria,* Scop. (*Rhus Cotinus,* Linn.) by its habit, its very small coriaceous leaves, less than half an inch in diameter, and by its crimson petals.

Cypripedilum Bardolphianum, W. W. Sm. et Farrer.

Species affinis *C. micrantho,* Franch. et *C. ebracteato,* Rolfe ; ab hoc floribus multo minoribus, ab illo foliis haud acuminatis, scapo haud villoso differt ; ab ambobus labello mire verrucoso distinguitur.

Planta 7–8 cm. alta. Folia duo opposita circ. 6 cm. longa, circ. 3 cm. lata, late oblanceolata apice subrotundata glabra. Scapus folia vix superans gracilis uniflorus pilis confervoideis sparse praeditus. Sepalum elliptico-ovatum obtusiusculum circ. 1.5 cm. longum viride ; synsepalum aequilongum elliptico-ovatum apice breviter apiculatum haud bidentatum. Petala sepalo aequilonga late lanceolata ± acuta viridia. Labellum

aureum petalis paulo brevius mire verrucosum. Ovarium sparse albido-furfuraceum.

"A most curious little plant, running about with single shoots and forming wide colonies in sunny glades and mossy woodland soil of the forest zone in the enormous gorges behind Siku, at about 8000 ft., and often in company with *C. luteum*. It has a noxious aromatic scent, and the ample lip is of shining waxy gold warted and deformed with knobs and whelks and bubuckles like Bardolph. Kansu, Western China." Farrer and Purdom. No. 139.

The following note is taken from the Gardeners' Chronicle, 15th May 1915, p. 258 :—

"Among Proud Margarets' * very roots, too, sometimes wanders a strange and humble little cousin—a ramifying running *Cypripedium*, perking up a 3-inch stem here and there with a pair of leaves, and then a small green-segmented half-awake flower with a lip of brilliant waxy orange, warty and whelked and bubuckled, and with an unpleasing aromatic scent that suggests (like the whole flower) the corruptness of a *Catasetum*."—R. F.

2637

Cypripedilum Farreri, W. W. Sm. Sp. nov.

Species affinis *C. fasciolato,* Franch. et *C. yunnanensi*, Franch.; priore multo minor, ab altero sepalis petalisque viridi-luteis ovario furfuraceo-puberulo inter alia ex descriptione differt.

Planta circ. 20 cm. alta. Folia plerumque duo, medio vel infra medium inserta, 5–7 cm. longa, 2.5–3 cm. lata, ovato-lanceolata, acuta vix acuminata, siccitate tenuiter membranacea, utrinque glabra, margine minute ciliolata; bractea 3–4 cm. longa, lanceolata vel ovato-lanceolata. Sepala et petala viridi-lutea purpureo-striata atque -maculata; sepalum superius circ. 3 cm. longum, circ. 1.2 cm. latum ovatum sensim acuminatum; synsepalum paululo longius ovato-lanceolatum apice bicuspidatum. Petala lateralia lineari-lanceolata circ. 4 cm. longa, erga basim circ. 6 mm. lata longiuscule acuminata apicem versus torta. Labellum petalis brevius, in sicco fere globosum 2.5–3 cm. diametro, ore parvo praeditum. Ovarium circ. 1.5 cm. longum dense albido-furfuraceum.

"Rare in the deep limestone gorges above Siku, under the shadier wall of the cliffs. June. Petals, etc., greeny-yellow, lined maroon; lip of waxy cream, lined internally, pulled into a series of vandykes at the mouth and very glossy and fragrant. Kansu, West China." Farrer and Purdom. No. 155.

* *Cypripedilum luteum,* Franch.

The following note is taken from the Gardeners' Chronicle, 15th May 1915, p. 258 :—

"Still rarer is the last Slipper I have this year noted. That is only found in cool loose woodland soil, in steep cool banks on the shady side of deep and precipitous limestone gorges at some 8000 ft. or higher. It lives among herbage and very scanty low scrub, evidently asking its shade of cliff, not plant, and seeks its model among the far-away Slippers of America. For here we come back to the twisted moustache of *C. Calceolus*; the whole plant is similar, though much slighter in build—a dainty growth of 6–8 inches, with two or three glossy emerald-green leaves to the stem. Usually only one stem comes up from the slender crown of roots; never more than two. No stem carries more than one flower. These have their cork-screwed petals and pointed sepals of a greenish-yellow, lined regularly with maroon. The lip is the essential originality of the plant, for it is so curiously pulled in below the mouth as to present a perfect soda-water-bottle shape, and round its rim is cut into the most elegant vandykes that catch the light and shine again. For the Slipper is of the waxiest gloss, and in colour of a very bland palest cream or butter-yellow, through which dimly show the broad bands of maroon with which it is striped on the inside. Finally, the inconspicuous strange charm of the plant is justified and enhanced by its intense and penetrating perfume of Lily-of-the-Valley."—R. F.

4471 **Cystacanthus affinis,** W. W. Sm. Sp. nov.

Species proxima *C. yunnanensi*, W. W. Sm. a quo primo intuitu vix differre videtur; ramulis, foliis, indumento, calyce glanduloso, floris structurā fere exacte quadrat; inflorescentia multo reducta plerumque 3–4-flora, calyce majore, corolla majore aliter colorata, stylo glabro recedit.

Suffrutex ad 2 m. altus. Inflorescentia terminalis pauciflora in speciminibus nostris 3–4-flora, paucis forsan delapsis. Calyx usque ad 2.5 cm. longus. Corolla fere 4 cm. longa extus flavida intus livide flava purpureo-striata; tubus medio circ. 2 cm. latus; lobi ad 1.5 cm. longi. Stamina 2 antheris ad 9 mm. longis. Ovarium circ. 5 mm. longum stylo 2 cm. paulo superante glabro. Fructus deest. Cetera cum specie sequenti quadrant.

"Shrub of 6 ft. Flowers exterior yellowish-grey, interior dull livid yellow, veined purple maroon. Open arid stony situations in the Fengkow Valley, Yunnan. Lat. 27° 40′ N. Alt. 8000 ft. June 1914." G. Forrest. No. 12,493.

4472

Cystacanthus yunnanensis, W. W. Sm. Sp. nov.

Species ex affinitate *C. cymosi*, T. Anders. a quo ex descriptione inflorescentia terminali ampla corollae lobis rotundatis differt.

Suffrutex erectus 1–1.5 m. altus; ramuli primo teretes dense incano- vel fulvo-villosuli tandem subtetragoni decorticantes cinerascentes. Folia 5–10 cm. longa, 3–4.5 cm. lata, ovata vel ovato-lanceolata, breviter obtusiuscule acuminata vel acuta, basi in petiolum 5–15 mm. longum attenuata, chartacea integra supra viridia dense ad nervos ceterum sparse fulvo-pilosula, infra subdense incano-villosula nervis lateralibus utrinque circiter 6 supra subobscuris infra paulo distinctioribus. Inflorescentia terminalis ampla ad 15 cm. longa anguste thyrsoideo-paniculata; bracteae 5–10 mm. longae lineari-lanceolatae dense glanduloso-villosae; pedicelli 1–2 mm. longi dense glanduloso-villosi. Calyx 1.5 cm. longus vel paulo ultro 5-partitus extus densissime glanduloso-villosus intus sparse villosulus; segmenta parum inaequalia linearia circ. 2 mm. lata acuta. Corolla 3–3.5 cm. longa pallide coerulea, basi albida, extus praesertim ad lineas longitudinaliter currentes pilis glanduloso-capitatis crebre pilosa; tubus e basi brevissima subito ventricosus incurvus medio circ. 1.5 cm. latus; lobi circ. 1 cm. longi rotundati, anteriores paulo longiores. Stamina 2 filamentis circ. 1.5 cm. longis basi pilosulis, antheris oblongis circ. 6 mm. longis. Ovarium circ. 4 mm. longum villosulum; stylus vix 2 cm. longus minute bidentatus per longitudinem longiuscule sparse villosus; ovula in quoque loculo ± 6. Fructus circ. 3.5 cm. longus circ. 5 mm. latus, subdense glanduloso-villosus; retinacula circ. 3 mm. longa; semina disciformia 2–3 mm. diametro minutissime (sub lente valido) puberula.

"Shrub of 2–4 ft. Flowers pale blue, white at base. Shady situations in thickets in the Tengchwan Valley, Yunnan. Lat. 26° 5′ N. Alt. 7000 ft. May 1913." G. Forrest. No. 10,007.

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Diospyros dumetorum, W. W. Sm. Sp. nov.

Species parvifolia haec affinis *D. Balfourianae*, Diels, foliis formā texturā indumento diversis dignoscitur.

Frutex ± 10 m. altus ramosus. Ramuli graciles primo dense fulvo-tomentosi. Folia petiolo ± 2 mm. longo dense fulvo-tomentoso suffulta; lamina vulgo 2–3.5 cm. longa, 1–1.3 cm. lata, lanceolata vel ovato-lanceolata vel oblanceolata, apice acuta apiculata (raro obtusa vel rotundata), basi rotundata vel late cuneata, texturā subcoriacea, supra pallido-viridis primo ± pilosula, tandem glabrescens, infra ad costam nervosque dense fulvo-pilosa, caetera sparsius; nervi supra obscuri infra

paululo distinctiores. Flores masculini in axillis superioribus 1–4-nati, numerosi approximati; pedicelli 1–4 mm. longi fulvo-tomentosi. Calyx campanulatus ± 3 mm. longus extus dense appresse pilosus ad medium vel fere ad imum in lobos lanceolatos acutos vel acuminatos divisus. Corolla olivacea 5–6 mm. longa extus glabra lineā albo-pilosa petalo cuique medianā excepta; lobi 4 circ. 1.5 mm. longi ovati. Stamina 16. Flores feminei fructusque desunt.

"Shrub of 30 ft. Flowers olive-green, fragrant. In open thickets on the Chungtien plateau, Yunnan. Lat. 27° 30′ N. Alt. 8000 ft. April 1914." G. Forrest. No. 12,399.

A small-leaved species; unfortunately female flowers and fruit are not available, but it is so distinct from the other Chinese species that I have ventured to describe it. The elevation is noteworthy.

6132 **Dracocephalum Purdomii**, W. W. Sm. Sp. nov.

Species affinis *D. grandifloro*, Linn. cui quoad habitum foliaque appropinquat, floribus minoribus calyce nisi dentibus ciliolatis glabro, corolla extus dense longiuscule villosa recedit.

Planta circ. 15 cm. alta. Caules basi adscendentes deinde erecti ± sparse albo-pilosi. Folia basalia ± 6 petiolo 3–4 cm. longo sparse piloso praedita; lamina circ. 3 cm. longa, circ. 1.5 cm. lata ovato-oblonga apice ± rotundata basi truncata vel cordata, crenata chartacea utrinque sparse setosula; caulina duo paria, minora breviter vel vix petiolata ceterum basalibus subsimilia. Inflorescentia terminalis densiflora subglobosa circ. 3 cm. diametro. Bracteae exteriores suborbiculares vel obovatae margine superiore irregulariter serratae serraturis apiculatis longiuscule albo-ciliatae ceterum glabrae, interiores oblanceolatae vel anguste oblongae supra ± 5-dentatae denticulis longissime aristatis vix spinosis, margine ciliatae. Calyx circ. 1.5 cm. longus; tubus rectus circ. 9 mm. longus epilosus; segmentum superius late ellipticum 3 mm. latum obtusum apiculo subspinescente praeditum margine ciliatum; 4 inferiora triangulari-lanceolata subspinescentia sparse ciliata vel subglabra. Corolla circ. 2.5 cm. longa saturate coerulea extus dense albo-villosa; tubus e basi angusta ad 7 mm. dilatatus, labium superius bilobum, inferius maculatum lobo mediano producto. Stamina paululo exserta filamentis albo-pilosis.

"Stony waysides in the alpine valleys of the Min S'an region, Kansu, West China. July 20, 1914." Farrer and Purdom. No. 180.

Closely related to *D. grandiflorum*, Linn. but with smaller flowers, an almost glabrous calyx, and a very woolly corolla.

Fraxinus trifoliolata, W. W. Sm. Sp. nov.

Species sectionis *Orni* distinctissima, foliis plerumque trifoliolatis infra densissime incano-hirsutulis conspicua.

Frutex 3–8 m. altus erectus; rami robusti subteretes vel ± complanati lenticellis parvis albidis notati glabri. Folia trifoliolata vel nonnunquam quinquefoliolata longe petiolata; petioli 5–6 cm. longi validi canaliculati, basi paulo incrassati glabri rubridi, supra ± dense incano-hirsutuli vel glabrescentes; petioluli laterales ± 1 cm. longi, medianus circ. 2 cm. longus, omnes dense incano-hirsutuli vel glabrescentes; foliola (medianum plerumque paulo majus) 8–12 cm. longa, 3.5–5 cm. lata, ovata acumine latiusculo acuminata, basi ± late cuneata, textura firme chartacea vel subcoriacea, per marginem totam regulariter serrato-denticulata denticulis induratis, supra atroviridia glabra infra densissime incano-hirsutula; nervi utrinque 12–16 supra impressi infra paulo eminentes dense incano-hirsutuli valde conspicui nervis secundariis bene reticulati. Inflorescentia terminalis ampla glabra fragrans. Calyx minutus, in fructu persistens, circ. 1 mm. longus campanulatus ad tertiam partem divisus lobis triangularibus acutiusculis. Petala 6–7 mm. longa linearia alba. Stamina petala aequantia. Fructus lineari-spathulatus circ. 3 cm. longus, apice rotundatus circ. 5 mm. latus, medio 3 mm., basi ima angustissimus.

"Shrub of 8–12 ft. In fruit. In thickets on the Yung-pi Mountains, Yunnan, West China. Lat. 26° 45′ N. Alt. 11,000 ft. Sept. 1913." G. Forrest. No. 11,054.

"Shrub of 10–25 ft. Flowers fragrant, creamy white. Anthers brown. Open dry situations amongst rocks and on ledges of cliffs in the Yangtze Valley at Fengkow, Yunnan. Lat. 27° 40′ N. Alt. 8000–9000 ft. June 1914." G. Forrest. No. 12,501.

A very distinct species of Ash. The trifoliolate leaves with the underside densely and finely hirsute are sufficient to mark it off from its allies—the nearest of which are *F. malacophylla*, Hemsl. and *F. ferruginea*, Lingelsh., both Yunnan species. The flowering specimens under No. 12,501 show more irregularity in the number of leaflets and have also more glabrous petioles.

Gaultheria dumicola, W. W. Sm. Sp. nov.

Species foliis magnis basi late rotundatis, inflorescentiis multo contractis vix ad sextam partem folii axillantis pertinentibus, calycis lobis subulato-acuminatis inter species chinenses indicasque (quarum nulli arcte propinqua) conspicua.

Frutex 1–3 m. altus ramulis glabris mox cinerascentibus. Folia petiolo 3–5 mm. longo glabro suffulta; lamina 8–17 cm.

longa, 4–9 cm. lata, ± late ovata, apice modice acuminata, calloso-apiculata, basi rotundata rarius late cuneata, dimidio superiore levissime serrulata, maturitate coriacea utrinque glabra nervis utraque facie conspicuis bene reticulatis; nervi laterales primarii tantum duo, prope basim orientes ad apicem arcuatim ascendentes. Inflorescentiae axillares contracto-racemosae vel corymbosae vel pseudo-umbellatae 3–4-multi-florae ± 1 cm. longae, in fructu ad 2 cm. auctae glabrae vel minute pilosulae; bracteae bracteolaeque 3–4 mm. longae lanceolatae vel subulato-lanceolatae ad basim inflorescentiae plerumque ± confertae glabrae vel glanduloso-ciliatae; bracteolae basim pedicelli versus affixae; pedicelli 3–5 mm. longi, fere ad 1 cm. aucti. Calyx purpureus circ. 3 mm. longus lobis triangulari-ovatis acutis glabris. Corolla calyce paulo longior, urceolata, ex collectore rubrido-viridis, glabra intus cerosa lobis ± 1 mm. longis triangularibus acutis. Stamina circ. 2 mm. longa filamentis minute pilosulis antheris apice biaristatis. Fructus maturus 5–6 mm. diametro loculicide apice 5-valvis seminibus numerosis angulatis castaneis.

"Shrub of 3–5 ft. Flowers ruddy green, anthers orange. Amongst scrub and rock on the hills to the west of Tengyueh, Yunnan. Lat. 25° N. Alt. 6000 ft. July 1912." G. Forrest. No. 8573.

"Shrub of 3–5 ft. In fruit. Open situations amongst scrub in the hills to the north of Tengyueh. Lat. 25° 15′ N. Alt. 7000 ft. May 1912." G. Forrest. No. 7730.

"Shrub of 6–10 ft. In fruit. Dry open situations in the Machang-Kai Valley, north of Tengyueh. Lat. 25° 20′ N. Alt. 6000–7000 ft. Feb. 1913." G. Forrest. No. 9568.

This is a very distinct plant not closely related to any of the Indian or Chinese species of *Gaultheria*.

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Gmelina montana, W. W. Sm. Sp. nov.

Species haec inter congeneres chinenses calycis lobis magnis, corollae tubo flavo, limbo bilabiato coeruleo-purpureo facile dignoscitur.

Frutex 1–3 m. altus; ramuli graciles flexuosi primo minute pubescentes glandulosi. Folia (superiora tantum visa) petiolo 5–10 mm. longo gracili minute glanduloso suffulta; lamina 2.5–3.5 cm. longa, 1.5–2.5 cm. lata, ovata vel subrhomboidea, apice acuta, basi plus minusve late cuneata, siccitate tenuiter chartacea, integra, supra viridis glabra, infra glauca dense minute glandulosa ad costam sparse pilosula nervis ± conspicuis. Inflorescentia anguste cymoso-paniculata; panicula 10–20 cm. longa racemiformis e cymulis remotis 1–7-floris composita; bracteae lineares vel lanceolatae ad 1 cm. longae foliaceae;

pedunculi ± 1 cm. longi, pilosuli atque minute glandulosi, ut pedicelli breves. Calyx 7–8 mm. longus, campanulatus parcissime pilosulus minute glandulosus; lobi 5 ovati circ. 3 mm. longi. Corolla 3.5–4 cm. longa extus sparse puberula; tubus flavus fere 2 cm. longus supra ventricose ampliatus; lobi 5 purpureo-coerulei rotundati, lobo antico caeteris multo majore fere 2 cm. longo. Stamina inclusa filamentis sparse minute capitato-glandulosis. Stylus glaber. Fructus deest.

"Shrub of 4–9 ft. Flowers—limb purplish-blue, tube yellow. Open situations amongst rocks on the western flank of the Tali Range, Yunnan. Lat. 25° 40′ N. Alt. 10,000 ft. Aug. 1913." G. Forrest. No. 11,662.

A slender floriferous species, growing at an altitude remarkable for the genus.

42413 **Indigofera calcicola,** Craib. Sp. nov.

Species nana lignosa ob folia brevia pilis argenteis arcte adpressis obtecta facile distinguenda.

Frutex nana, 0.3–1.2 m. altus (ex Forrest); ramuli primo pilis albis interdum etiam brunneis medifixis dense tecti, mox glabri, brunneo- vel fusco-brunneo-corticati, laterales breves, cicatricibus prominentibus satis approximatis conspicue instructi; rami glabri, lenticellati, cortice mox transverse dissiliente tecti. Folia 5–9-foliolata, 8–13 mm. longa, petiolo circiter 3 mm. longo suffulta, pilis argenteis medifixis adpressis omnino tecta, cum racemis ad apices ramulorum terminalium et lateralium brevium gesta; stipulae minutae; foliola elliptica, rotundata vel fere obcordata, apice rotundata vel parum retusa mucronata, basi late cuneata rotundatave, circa 4 mm. longa et 2.5 mm. lata, satis crassa, nervis lateralibus obscuris, petiolulo plerumque circiter 0.5 mm. longo suffulta; stipellae minutae. Racemi in ramulo quoque 1–3, foliis breviores vel ea paulo superantes; bracteae parvae rigidae fugaces; pedicelli 1 mm. longi, interdum paulo breviores. Calyx vix 2 mm. longus, lobis inter se parum inaequalibus ovato-oblongis acutiusculis obtusisve 0.75 mm. longis ciliatis saepius glanduloso-fimbriatis. Vexillum elliptico-oblongum vel ovato-oblongum, sessile, retusiusculum, 7 mm. longum, 5.25–5.5 mm. latum; alae oblongae, 7.5 mm. longae, 1.5 mm. latae; carina 7 mm. longa, 2.5 mm. lata. Legumen vix maturum, teres, dense crispatim hirsutulum.

Yunnan:—Mountains in the N.E. of the Yangtze bend. Shrub of 3–4 ft. Dry stony situations, 10,000 ft. G. Forrest. No. 10,350.

Yunnan:—Mountains in the N.E. of the Yangtze bend. Dwarf shrub of 1–2 ft. Flowers dull rose. Open situations on limestone rocks, 11,000 ft. G. Forrest. No. 10,505.

Indigofera dumetorum, Craib. Sp. nov.

Inter species grandifloras ab affinioribus *I. Duclouxii*, Craib et *I. Pampaniniana*, Craib, foliis 5–9-foliolatis distinguenda.

Frutex 1.4–4.2-metralis (ex Forrest) ; ramuli juventute pilis ferrugineis vel griseis divergentibus densius tecti, basi squamis paucis fusco-brunneis instructi ; rami plus minusve glabrescentes, saepe flexuosi, teretes parumve angulati, lenticellati, cortice rubro-brunneo vel cinereo obtecti. Folia 5–9-foliolata, ad 13 cm. longa, petiolo communi saepius 1–1.5 cm. longo suffulta, rhachi petiolo communi et petiolulis indumento ut ramulis tectis ; stipulae cito deciduae, 5–6 mm. longae, basi 1–2 mm. latae ; foliola lateralia oblongo-elliptica, elliptica vel rarius ovata, basi rotundata, late cuneata vel interdum subtruncata, ad 5 mm. longa et 3 mm. lata, petiolulis circa 2 mm. longis suffulta, terminalia a lateralibus usque ad 2 cm. distantia, saepius obovata vel late elliptica, rarius orbicularia vel ovata, usque ad 5 cm. longa et fere 5 cm. lata, omnia chartacea, subtus pallidiora, pagina superiore demum parcius inferiore densius pilis albis plus minusve crispatis ad costam marginesque interdum ferrugineis tecta, nervis lateralibus utrinsecus 8–10 supra subconspicuis subtus, saltem in foliis maturis, prominentibus saepissime rectis vel subrectis ; stipellae obsoletae. Racemi in ramulo quoque saepissime 3, ex axillis inferioribus orti, circa 10 cm. longi, pedunculo communi 1.5–2 cm. longo suffulti, rhachi, pedunculo pedicellisque indumento ei ramulorum simili tectis ; alabastra omnino pubescentia, juventute haud dense aggregata, reflexa, floribus expansis plus minusve patulis, pedicellis iterum post anthesin decurvatis ; bracteae alabastra haud aequantes, cito deciduae ; pedicelli 3 mm. longi. Calyx 4.5 mm. longus, lobo longissimo tubo subaequilongo. Vexillum oblongum, 15 mm. longum, 7 mm. latum, emarginatum, apiculatum, subsessile ; alae 12 mm. longae, 2.5 mm. latae ; carina vexillo subaequilonga, unguiculata. Legumina 6.5 cm. longa, lateribus rotundata, pallide brunnea vel cinereo-brunnea, breviter crispatim albopubescentia.

Yunnan :—Mountains in the N.E. of the Yangtze bend. Shrub of 8–10 ft. Flowers pale yellow. Open situations in side valleys. 8000–9000 ft. G. Forrest. No. 10,734.

Yunnan :—Fengkow Valley. Shrub of 8–12 ft. Flowers pale lemon-yellow, alae rose-purple. Open dry situations among scrub. 7000 ft. G. Forrest. No. 12,494.

Yunnan :—On the Tong Shan in the Yangtze bend. Shrub of 4–5 ft. Open dry situations amongst scrub. 10,000 ft. G. Forrest. No. 11,018.

3702 **Linaria yunnanensis,** W. W. Sm. Sp. nov.

Species affinis *L. thibeticae,* Franch. a qua foliis latis, inflorescentiis densis, calcare minimo inter alia signa recedit.

Planta annua 45–75 cm. alta erecta. Caulis sat robustus subteres glaucus infra fere nudus supra bene foliatus, glaber vel subglaber regione inflorescentiae villosulae excepta. Folia sessilia alterna late lanceolata vel late oblanceolata vel subelliptica, vulgo 4–6 cm. longa, 1.5–3.5 cm. lata, basi ± late cuneata apice breviter acutata, integra carnosula glabra supra laete viridia infra glauca. Inflorescentia simplex vel ramosa ; rami (usque 7) elongati 10–20 cm. longi erecto-fastigiati apice tantum floriferi, pilis confervoideis fulvis ± dense induti. Flores in racemos densos ± 20-floros 4–5 cm. longos (in fructu ad 10 cm. auctos) dispositi ; bracteae lanceolatae vel ovatae ± 5 mm. longae confervoideo-pilosae ; pedicelli ± 2 mm. longi floribus breviores pilosae. Calycis 7–8 mm. longi lobi lineari-oblongi praesertim ad margines dense confervoideo-pilosi. Corolla lutea ± 12 mm. longa ; calcar 4 mm. longum aduncum gracile ; tubus circ. 6 mm. longus, basi ± 5 mm. latus ; labium anticum ad palatum villosulum. Capsula globosa seminibus discoideis ± 100 nigridis ± 1.5 mm. diametro ala lata cinctis disco muriculato praeditis.

" Plant of 18–30 inches. Flowers yellow. In fruit. Open stony pasture on the Chungtien plateau, Yunnan. Lat. 27° 55′ N. Alt. 9000–10,000 ft. Sept. 1913." G. Forrest. No. 11,001.

Also cultivated (from seeds collected by George Forrest) and flowering in August, 1915.

1055 **Lonicera Farreri,** W. W. Sm. Sp. nov.

Species ex affinitate *L. serpyllifoliae,* Rehder et *L. aemulantis,* Rehder a quibus foliis glaberrimis inter alia differt ; haud procul a *L. obovata,* Royle, specie himalaica.

Fruticulus gracilis circiter metralis ramulis junioribus rubridis glabris vetustioribus griseis. Folia decidua floribus subcoetanea atque una cum eis prima aetate apicem ramulorum versus approximata, usque ad 1 cm. longa, 2–3 mm. lata, oblanceolata vel anguste obovata apice rotundata vel obtusissima, basi in petiolum vix 1 mm. superantem cuneata, textura tenuia supra laete viridia glaberrima infra pallidiora in parte inferiore ad costam squamis lunatis albidis seriatim praedita cetera glabra ; nervi bene reticulati pellucidi. Flores bini pedunculis gracilibus erectis circ. 4 mm. longis glabris suffulti ; bracteae lineari-lanceolatae vel subulatae glabrae circ. 4 mm. longae ovariis longiores ; bracteolae minutae circ. 0.5 mm. longae ovatae ad medium vel ultro connatae glabrae. Ovaria fere ex toto connata

vix 2 mm. longa, glabra ut margo calycis brevis denticulata. Corolla gracilis tubulosa 12–13 mm. longa extus glabra intus basi sparse albo-villosa roseo-purpurea ; tubus ± 1 cm. longus gracillimus basi gibbosus ; lobi suborbiculares erecti subaequales. Stamina medio tubo inserta, corollae lobos paululo superantia filamentis glabris. Stylus exsertus, stamina paulo superans in parte inferiore sparse albo-villosus. Fructus desunt.

"A little frail bush of 3 feet or so, with *flattened* outspread sprays from which the rosy bugles hang—a plant of unique charm. There are larger and coarse approximations to this, in the lower Alpine coppice of the Satanee Range, from 7000–8000 ft.; but of this form I have only seen two certain plants—one just above Chago by the pathside, and the other on a cliff above a torrent in a deep ghyll behind Ga-hoba. 6th May, 10th May 1914. Kansu, West China." Farrer and Purdom. No. 46.

This new species will occupy in Rehder's Synopsis of the Genus Lonicera (Miss. Bot. Gard. Rep., 1903, p. 53) a place next to *L. aemulans*, Rehd.; or if the very small bractlets are given importance, it must be placed next to *L. obovata*, Royle. In habit it is not unlike *L. microphylla*, Willd., from which its long slender corolla with short lobes is a sufficient mark of distinction.

26138 **Microstylis orbicularis,** W. W. Sm. et J. F. Jeff. Sp. nov.

Species ex affinitate *M. acutangulae*, Hook. f.; habitu floribusque valde similis ; floribus purpureis minoribus labelli auriculis diversis inter alia signa minora divergit ; ab omnibus speciebus chinensibus adhuc descriptis satis remota.

Planta terrestris erecta 30–50 cm. alta, rhizomate brevi, bulbo subterraneo ovoideo vaginis membranaceis circumdato. Folia 2–3, erecto-patentia, petiolo scapum basi alte vaginante, usque ad 15 cm. longa ad 4 cm. lata, late lanceolata acuta siccando tenuiter membranacea utrinque glabra. Scapus erectus strictus folia multo superans glaber basi longe nudus, medio atque superne bracteis lineari-lanceolatis 6–8 mm. longis deflexis crebre ornatus ; racemus sublaxe multiflorus pedicellis cum ovariis gracilibus ± 5 mm. longis. Flores siccitate atro-purpurei illis *M. acutangulae* forma subsimiles ; sepala libera patentia, lateralia ± 5 mm. longa elliptica obtusa, posticum angustius ± 6 mm. longum 3-nervium. Petala sepalum posticum vix aequantia linearia ; labellum sessile latissimum ambitu fere orbiculare ± 8 mm. diametro lamina denticulis ± 20 alte pectinata auriculis laminam ± aequantibus columnam amplectentibus apice subrotundatis basi lamina haud discretis. Columna brevis ; **ovarium anguste clavatum glabrum.**

In the neighbourhood of Tengyueh, Yunnan, 1912. Howell. No. 334.

Microstylis acutangula, Hook. f., from the Malay Peninsula, appears to be the nearest akin to the above species (see Hook. Ic. Plant. tab. 1835); the structure of the flower is very similar, though there are differences in the colour and in the labellum. The specific name refers to the orbicular outline of the labellum and its auricles.

3243 **Onosma album,** W. W. Sm. et J. F. Jeff. Sp. nov.

Species affinis *O. exserto*, Hemsl.; habitu minore, foliis linearibus, calyce aliter setoso, corolla alba inter alia signa recedit.

Planta 60 cm. alta erecta. Caulis ut videtur solitarius e radice crassa ortus, infra inflorescentiam simplex sat foliosus setis longiusculis patentibus basi tuberculatis atque setulis albidis densissime vestitus. Folia basalia, ut caulina, linearia, 8–10 cm. longa, 7–8 mm. lata, acuta, basi paulo attenuata, sessilia, crassiuscula, supra viridia dense setosa atque setosula infra incana densissime setosula setis longiusculis paucis intermixtis; costa supra immersa infra eminens setosa. Inflorescentia terminalis ad 30 cm. longa e cymis scorpioideis paucifloris racemose dispositis composita; bracteae primariae 2–4 cm. longae ovato-lanceolatae ceterum foliis similes, supra sensim magnitudine decrescentes; bracteae secundariae multo minores; pedunculi graciles patentes sub anthesin ± 6 cm. longi, circ. 5-flori, cum pedicellis 1–2 cm. longis dense setosi atque setosuli. Calyx circ. 1.3 cm. longus ad basim in lobos quinque lineares partitus dense strigoso-setosus. Corolla calyce paululo longior, circ. 1.4 cm. longa, tubulosa supra paulo ampliata, ore ± 5 mm. lata, extus dense setosulo-incana, alba, lobis circ. 2 mm. longis triangularibus erectis vel apice breviter revolutis. Stamina ad ± 5 mm. exserta filamentis glabris, antheris cohaerentibus ± 1 cm. longis. Stylus circ. 2 cm. longus filiformis erga basim sparse pilosulus. Fructus deest.

"Plant of 2 ft. Flowers pure white. Open, dry, stony pasture on the Yung-pi Mountains, Yunnan. Lat. 26° 45′ N. Alt. 10,000 ft. Sept. 1913." G. Forrest. No. 11,188.

3218 **Onosma cingulatum,** W. W. Sm. et J. F. Jeff. Sp. nov.

Species affinis *O. Forrestii*, W. W. Sm. speciei haud bene cognitae; foliorum forma atque indumento, corolla intus glabra annulo capillorum alborum basilari excepto inter alia divergit.

Planta usque ad 1.5 m. alta erecta. Caulis robustus setis

setulisque fulvis vel albidis dense vestitus. Folia basalia et inferiora non visa ; caulina superiora 6–8 cm. longa, 1.5–2 cm. lata, lanceolata vel oblongo-lanceolata, apice ± acuta, basi attenuata vix petiolata, siccitate crassiuscula, supra viridia setis tuberculatis dense vestita, infra praesertim ad costam setis setulisque abunde praedita. Inflorescentia ramosa, cymis racemiformibus in paniculam terminalem 30–60 cm. longam dispositis ; rami ± patentes 10–15 cm. longi dense fulvo-setosi atque setulosi, ut pedicelli ± 1 cm. longi ; bracteae inferiores foliis similes sed minores, superne sensim decrescentes, supremae breves lineares. Calyx ± 1 cm. longus ad basim in lobos lineares partitus dense fulvo-setosus atque setulosus. Corolla ± 1 cm. longa calycem aequans tubulosa supra staminum insertionem sensim dilatata ad fauces in sicco ± 6 mm. lata, extus dense setuloso-incana, intus glabra annulo capillorum alborum sub insertionem staminum posito excepto, rosea, lobis brevissimis vix 1 mm. longis, 3 mm. latis obtusis saepe apiculatis. Stamina inclusa filamentis circ. 4 mm. longis glabris, antheris basi levissime cohaerentibus ± 4 mm. longis. Stylus calycem ± aequans glaber. Nuculae ovoideae laeves glabrae ± 2 mm. longae.

Yunnan:—In pastures on plateaux near Tcha-ho. Alt. 2800 m. Flowers rose. E. E. Maire. Nos. 296 (anno 1914), 892 (anno 1906) in Herb. Edin.

The annulus of white hairs near the base of the corolla-tube brings this species near to *O. Forrestii*, W. W. Sm., and distinguishes it easily from the other Chinese species.

Onosma Hookeri, Clarke, var. **Wardii,** W. W. Sm. Var. nov.

A planta typica sikkimensi habitu elatiore caule flexuoso folioso, foliis latioribus, inflorescentia laxiore, floribus paulo majoribus, calyce 1.5 cm. longo, corolla ± 2 cm. longa, aliquantulum recedit. In speciminibus cultis corolla purpureo-coerulea, ore rubra.

N.W. Yunnan:—At Ka-gwr-pw near the Tibetan frontier, at an elevation of 13,000 ft. July 1913. F. K. Ward. No. 902.

Grown also from seed by Bees, Ltd.

Onosma oblongifolium, W. W. Sm. et J. F. Jeff. Sp. nov.

Inter species sinenses himalaicasque haec foliis magnis oblongis latissimis distinguitur.

Planta 60–75 cm. alta erecta. Caulis ut videtur solitarius robustus e radice crassa ortus infra inflorescentiam simplex sat foliosus setis basi tuberculatis setulisque hispidus. Folia basalia delapsa ; caulina 8–12 cm. longa, 3–4 cm. lata, oblonga apice

obtusa basi rotundata vix attenuata, sessilia insertione lata, crassiuscula, supra viridia setis tuberculatis setulisque scabrida infra pallidiora dense setosula; costa infra eminens setosula setis longiusculis paucis intermixtis; folia suprema ± ovato-oblonga sensim decrescentia. Inflorescentia ramosa cymis racemiformibus in paniculam terminalem usque ad 25 cm. longam dispositis; rami subfastigiati 10–20 cm. longi dense setuloso-hispidi; pedicelli ± 1 cm. longi setulosi; bracteae inferiores foliis similes sed ovatae minores, superne sensim decrescentes, supremae breves lineares. Calyx ± 1 cm. longus ad basim in lobos lineares partitus patenti-setosus atque dense setuloso-hispidus. Corolla circ. 1–5 cm. longa tubulosa supra staminum insertionem sensim dilatata ad fauces 7–8 mm. lata, extus dense setuloso-incana, intus parce setulosa, coeruleo-rosea, lobis brevissimis vix 1 mm. longis, 3 mm. latis obtusis. Stamina inclusa filamentis circ. 7 mm. longis pilosulis, antheris cohaerentibus ± 7 mm. longis. Stylus circ. 1.8 cm. longus sparse pilosulus. Nuculae ovoideae apiculatae tuberculatae sub lente lepidotae.

"Plant of 2–2½ ft. Flowers bluish-rose. Open stony pasture in the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 10,000 ft. Sept. 1913." G. Forrest. No. 11,198.

The broad oblong leaves distinguish this species well. The tuberculate finely lepidote seeds are also noteworthy.

5234 **Oxyspora Howellii,** J. F. Jeff. et W. W. Sm. Sp. nov.

Species ex affinitate *Oxysporae vagantis*, Wall.; primo intuitu ramulis petiolis pedunculis dense ferrugineo-hirsutis, inflorescentia angustiore recedit; ab *Oxyspora serrulata*, Diels, inflorescentia ferrugineo-hirsuta vel -furfuracea differt.

Frutex ramosus altitudinis non notae; rami cortice brunneo praediti; novelli dense ferrugineo-hirsuti atque ferrugineo-furfuracei. Folia petiolo 2–3 cm. longo dense ferrugineo-hirsuto praedita; lamina 8–12 cm. longa, 4–6 cm. lata, late lanceolata vel elliptico-lanceolata, basi late cuneata, apice longiuscule acuminata, membranacea, serraturis setosis serratula, supra laete viridis glabra vel subglabra, subtus pallidior in costa venisque densiuscule ferrugineo-hirsuta atque furfuracea, cetera sparsius furfuracea; nervi primarii 3 secundariis transversis parallelis conjuncti; secundarii marginales sursum arcuati in nervos intramarginales duos primariis multo indistinctiores conjuncti. Panicula terminalis 30–50-flora, 10 cm. longa vel ultra; pedunculi infra ferrugineo-hirsuti, supra cum petiolis 3–5 mm. longis furfuracei; bracteae subulatae vix 1 mm. longae. Receptaculum circ. 4 mm. longum, ore circ. 3 mm. latum, clavato-campanulatum, sparsius furfuraceum; lobi brevissimi

triangulares. Petala circ. 4 mm. longa, late ovata, in sicco purpurea. Stamina 8, subsimilia flava, longiora 8–9 mm. longa. Stylus filiformis stamina subaequans. Fructus deest.

In the neighbourhood of Tengyueh, Yunnan, at an altitude unknown. Howell. No. 125 in Herb. Edin.

The nearest ally is the Khasian *Oxyspora vagans*, Wall. We do not find that the stamens are differentiated into four purple and four yellow, but possibly the flowers are not developed sufficiently far for the purple colour to become manifest.

Passiflora (§ **Decaloba-Polyanthea**) **jugorum**, W. W. Sm. Sp. nov.

Inter species chinenses ad *P. Henryi*, Hemsl. spectat quae ramis glabris floribus fasciculatis minoribus corona fauciali duplici differt; haud procul a *P. Leschenaultii*, DC. quae floribus solitariis inter alia divergit; a *P. cupiformi*, Mast. floribus majoribus corona fauciali simplici dignoscitur; *P. perpera*, Mast. valde affinis ramis glabris discriminatur.

Frutex scandens ad 2–3 m. pertinens ramis floriferis gracilibus sulcatis dense albido-patenti-pilosis. Folia vulgo 4–6.6 cm. longa 4–6.6 cm. lata, forma eis *P. Leschenaultii*, DC. subsimilia, truncata, margine inferiore rotundata, margine superiore trilobata lobis apiculatis lateralibus triangularibus acutis paululo patentibus intermedio multo minore, tenuiter papyracea supra glabra nisi ad nervos marginesque pilosulos, infra subdense molliter albido-pilosa; nervi basi orientes 5, exteriores nonnunquam minus distincti; petioli ad 2.5 cm. longi dense patenti-pilosi sub medio glandulis duabus sessilibus ornati. Cirrhi simplices graciles. Flores circ. 3 cm. diametro cymosi; cymae saepius in foliorum axillis binae vulgo 3–7-florae petiolos vix superantes ramulis pilosis; pedunculi articulati 1–1.3 cm. longi glabri. Sepala et petala subsimilia circ. 1.5 cm. longa ovato-oblonga obtusa. Corona faucialis simplex; filamenta filiformia petalis triente breviora; corona interior erecta plicata. Ovarium globosum glabrum gynophoro circ. 6 mm. longo suffultum. Fructus deest.

"Scandent shrubby plant of 6–9 ft. Flowers pale creamy-white and purple. On scrub in open situations on the Shweli-Salween divide, Yunnan. Lat. 25° N. Alt. 8000 ft. April 1914." G. Forrest. No. 12,330.

A much more pilose plant than its nearest Chinese allies. As in the allied *P. Henryi*, the leaves show much variation, truncate and non-truncate leaves appearing on the same shoot. Such a variety is exemplified in the sheet quoted below.

"Scandent shrubby plant of 6–9 ft. Flowers creamy-yellow, with purplish centre. On scrub and rock in lava-bed west of

Tengyueh, Yunnan. Lat. 25° N. Alt. 5000 ft. May 1913." G. Forrest. No. 11,941.

Pieris bracteata, W. W. Sm. Sp. nov.

Species affinis *P. japonicae,* D. Don a qua habitu, racemis longebracteatis, calyce lobato nec partito, lobis omnino diversis, ovario semi-supero inter alia signa recognoscitur.

Frutex 1–2 m. altus erectus ramulis robustis strictis glabris. Folia superiora tantum visa circ. 4.5 cm. longa, 1–1.5 cm. lata, subsessilia, lanceolata, apice acuminata, basi cuneata, coriacea margine serrulata utrinque glabra, supra atroviridia, infra olivacea, nervis supra obscuris infra paulo conspicuis. Inflorescentiae in axillis foliorum terminalium orientes ± approximatae racemosae; racemi 3–5, erecti stricti ± 15 cm. longi laxiflori glabri; bracteae conspicuissimae 1–2 cm. longae, 3–5 mm. latae, lanceolatae acuminatae glanduloso-serrulatae olivaceae subpersistentes; bracteolae lineares; pedicelli 3–4 mm. longi. Flores ± nutantes albi roseo-tincti fragrantes. Calyx circ. 2.5 mm. longus glaber; pars inferior semiglobosa ovario adhaerens; lobi ± 1 mm. longi ovati apice obtusi vel acuti saepe subfimbriati. Corollae ± 1 cm. longae tubus cylindricus 3–4 mm. latus glaber vel subglaber; lobi 5 triangulares 1.5–2 mm. longi. Stamina circ. 6 mm. longa filamentis ad 3 mm. longis longiuscule albo-pilosis apice biaristatis, antheris tubulis brevioribus. Ovarium semisuperum glabrum; stylus circ. 9 mm. longus. Fructus deest.

"Shrub of 3–5 ft. Flowers white, tinged deep-rose. Fragrant. Open situations amongst scrub in the hills to the east of Tengyueh, Yunnan. Lat. 25° N. Alt. 6000–7000 ft. Nov. 1912." G. Forrest. No. 9255.

This is a peculiar species of *Pieris,* akin in its foliage to *P. japonica,* D. Don, in its flower to *P. ovalifolia,* D. Don. The semi-superior ovary and the calyx-lobes, along with the very conspicuous bracts, serve to distinguish it readily from its congeners.

Pieris compta, W. W. Sm. et J. F. Jeff. Sp. nov.

Species yunnanensis foliis parvis ellipticis integris obtusis haud acuminatis subtus pulchre reticulatis, corolla extus albopilosula bene conspicua.

Frutex sempervirens ramis teretibus gracilibus primo minute pubescentibus cito glabrescentibus. Folia 1.5–2.5 cm. longa 5–15 mm. lata latiuscule vel anguste elliptica apice rotundata vel obtusa minute indurato-apiculata basi rotundata vel subrotundata, integra paululo revoluta corneo-marginata valde

coriacea supra olivacea glabra costa inconspicua nervis obscuris infra pallidiora glabra vel subglabra (basim ipsam versus nonnunquam pilosa) glandulis minutis nigris conspersa pulchre reticulata costa nervisque elevatis; petiolus 1–2 mm. longus pilosulus vel subglaber; folia regionis floralis minora subbracteiformia. Racemi apicem ramulorum versus 5–6-approximati axillares 10–15 cm. longi simplices graciles multiflori fere ad basim floriferi minute puberuli; flores nutantes dimidio inflorescentiae inferiore distantes (1–1.5 cm.) in axillis foliorum caulinis similium orientes, supra magis approximati bracteis lanceolatis vel oblanceolatis 3–5 mm. longis praediti; pedicelli ± 5 mm. longi arcuati puberuli basi bracteolis duabus subulatis ornati, in fructu ad 1 cm. aucti. Calycis sparse pilosuli lobi circ. 2 mm. longi ovato-lanceolati acutiusculi coriacei glandulis minutis nigris conspersi. Corolla urceolaris alba 5–6 mm. longa extus ± dense appresse albo-pilosula lobulis brevibus triangularibus erectis. Stamina 10 inclusa; filamenta basi corollae cohaerentia infra complanata medio geniculatim flexa; antherae conspicue biaristatae. Ovarium depresso-globosum sericeo-pilosulum. Fructus globosus circ. 3.5 mm. diametro; semina delapsa.

Yunnan:—In the vicinity of Yunnansen. Shrub of moist valleys. Flowers milky white. E. E. Maire. No. 1071 (anno 1906) in Herb. Edin. Moist places in the mountains. Maire. No. 1874 (anno 1906) in Herb. Edin.

A graceful shrub with very distinctive foliage. The flowers are borne in slender racemes somewhat distant, subtended below by foliage leaves which diminish gradually until in the upper part of the inflorescence they are replaced by small bracts less than half the length of the pedicels.

4401

Pieris polita, W. W. Sm. et J. F. Jeff. **Sp. nov.**

Species ex affinitate *P. japonicae,* D. Don a qua inflorescentiis elongatis simplicibus gracilioribus substrictis, calyce triente longiore inter alia recedit.

Frutex sempervirens ramis teretibus eis socii supra citati similibus. Folia 7–12 cm. longa, 1.5–3 cm. lata lanceolata vel lineari-lanceolata vel oblanceolata apice acuta vel eodem specimine rotundata, basi in petiolum 5–8 mm. longum glabrum cuneata, apice tantum minute serrulata coriacea supra atroviridia glabra costa paulo elevata minute glanduloso-puberula excepta, infra pallidiora glabra costa straminea eminente, utrinque glandulis minutis nigris raris conspersa, nervis venulisque supra sat conspicuis infra saepe indistinctis. Racemi 5–10 apicem rami versus aggregati axillares 8–12 cm. longi simplices graciles substricti multiflori fere ad basim floriferi

minute glanduloso-puberuli ; bracteae 2–3 mm. longae subulatae glabrae ; pedicelli ± 5 mm. longi minute puberuli medio bracteolis duabus subulatis praediti. Calycis lobi circ. 4 mm. longi ovato-lanceolati acuti coriacei glandulis minutis nigris conspersi. Corolla urceolaris, ut videtur alba, 7–8 mm. longa ore circ. 3 mm. diametro lobulis brevissimis erectis rotundatis. Stamina 10 inclusa eis *P. japonicae* subsimilia. Ovarium depresso-globosum stylo gracili corollam aequante. Fructus deest.

In the N.W. of the Province of Fukien. 1914. Coll. J. de la Touche. No. 68.

A species closely allied to *Pieris japonica*, D. Don, but with a very distinct inflorescence of long substrict racemes, much slenderer than those of its ally and without branching.

7391 **Plectranthus oresbius,** W. W. Sm. Sp. nov.

Species valde affinis *P. rugoso*, Wall. a quo habitu ramosissimo foliis minoribus utrinque incano-tomentosis floribus lavandulaceis inter alia discrepat.

Fruticulus usque ad 60 cm. altus ramosissimus ramis vetustioribus defoliatis decorticantibus, junioribus bene foliatis densissime incano-stellato-tomentellis. Folia petiolo ± 3 mm. longo tomentello suffulta, ovata apice obtusa basi rotundata vel cordatula, regulariter crenulata, crassiuscula, 8–13 mm. longa, 5–9 mm. lata, supra dense incano-stellato-tomentella, infra densissime niveo-tomentella, utrinque rugosula. Racemus foliatus ; cymae ex axillis foliorum superne decrescentium ortae plerumque 4–5-florae ; pedunculi ad 5 mm. longi tomentelli. Calyx ± 3 mm. longus fulvo-tomentellus usque ad medium in dentes 4–5 subaequales triangulares acutos fissus. Corolla lavendulacea extus pilosula ; tubus paululo calyce exsertus basi gibbus ; limbus tubo subaequalis labio postico 4-fido vix 3 mm. longo.

" Shrub of 2 ft. Flowers pale soft lavender, fragrant. Open dry situations amongst rocks on the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 11,000 ft. Sept. 1913." G. Forrest. No. 11,154.

7404 **Plectranthus tenuifolius,** W. W. Sm. Sp. nov.

Species ex affinitate *P. rugosi*, Wall. et *P. oresbii*, W. W. Sm. foliis minimis haud stellato-tomentosis inter alia divergit ; structura floris ad *P. glaucocalycem*, Maxim. spectat.

Fruticulus usque ad 60 cm. altus ramosissimus ramis vetustioribus griseis, junioribus elongatis gracillimis dense incano-tomentellis. Folia petiolo ± 1 mm. longo tomentello

suffulta, lanceolata vel ovato-lanceolata apice acuta vel acutiuscula basi ± cuneata vel subrotundata, integra siccitate chartacea 8–10 mm. longa, 4–5 mm. lata, supra viridia dense minute pilosula infra densissime incano-tomentella. Racemus foliatus ad 20 cm. longus cymulis remotis plerumque 4–5-floris ex axillis foliorum superne decrescentium ortis ; pedunculi 2–5 mm. longi et pedicelli tomentelli. Calyx circ. 2 mm. longus (fructu fere ad 4 mm. auctus) incano-tomentellus ad trientem in dentes subaequales triangulares acutos fissus. Corolla pallido-coerulea extus pilosula ; tubus vix exsertus basi cylindricus ; limbus tubo paululo longior limbo postico 4-fido. Filamenta parte inferiore pilosula. Semina brunnea.

"Shrub of 2 ft. Flowers pale blue. Open situations in the Yangtze Valley at Pung-tzu-la, Yunnan. Lat. 27° 50′ N. Alt. 6000 ft. August 1914." G. Forrest. No. 13,184.

Pouzolzia elegantula, W. W. Sm. et J. F. Jeff. Sp. nov.

Species valde affinis *P. eleganti,* Wedd. a qua foliis minoribus rhomboideis grossius incisis inter alia differt.

Fruticulus metralis ramulis patulis teretibus dense hispidulis. Folia alterna ± 1 cm. longa, ± 1 cm. lata, rhomboidea, apice ipso acuta, basi late cuneata, in parte inferiore integra, supra grosse serrata serraturis utrinque 3–4, utraque facie subcinerascentia adpresse strigosula ; petiolus ± 1 mm. longus ; stipulae parvae ovatae acuminatae. Inflorescentiae ex axillis omnibus ortae 2–3 mm. latae floribus femineis masculisque intermixtis. Calycis segmenta 4 acuminata extra hispidula. Stamina ovarium achaenium eis *P. elegantis,* Wedd. subsimilia.

"Shrub of 3 ft. Flowers brown. Dry rocky situations on the Tong Shan, Yunnan. Lat. 27° 20′ N. Alt. 8000 ft. July 1914." G. Forrest. No. 12,723.

A dwarf shrub differing from the Formosan plant *P. elegans,* Wedd. in the small rhomboid leaves, which are deeply incised in proportion to their size. Forrest No. 12,590, from the Chungtien plateau, agrees with Hancock's No. 326 referred in Journ. Linn. Soc. xxvi, 489, to *P. elegans,* Wedd.

Premna acutata, W. W. Sm. Sp. nov.

Species valde affinis *P. yunnanensi,* W. W. Sm. a qua foliis ad 10 cm. longis, 5 cm. latis, lanceolatis vel ovato-lanceolatis longiuscule acuminatis basi late cuneatis argute serratis utrinque sparse pilosulis vel subglabris, calyce altius fisso divergit.

"Shrub of 3–5 ft. In fruit. Open scrub on the Tong Shan

in the Yangtze bend, Yunnan. Lat. 27° 20′ N. Alt. 9000 ft. Sept. 1913." G. Forrest. No. 11,058.

"Shrub of 6–9 ft. Fruits black. July 1914." G. Forrest. No. 12,739.

Premna mekongensis, W. W. Sm. Sp. nov.

Species valde affinis *P. yunnanensi,* W. W. Sm. a qua foliis pilosioribus calyce altius fisso lobis angustioribus, corolla longiore flavida inter alia divergit.

Fruticulus 60–90 cm. altus erectus ramosus; rami teretes juniores tomento incano crispato dense tecti. Folia siccitate chartacea vulgo 3–5 cm. longa, 2–3 cm. lata, ovata, apice acuta vel subobtusa, vix acuminata, basi rotundata, crenato-serrata, supra modice incano-pilosula, infra breviter incano-tomentosa nervis utrinque 4–5 supra obscuris infra sat conspicuis; petioli ± 1 cm. longi incano-tomentosi. Cymae terminales subglobosae circ. 1 cm. diametro densiflorae 6–12-florae pedunculis pedicellisque brevissimis incano-pilosis bracteis bracteolisque linearibus dense pilosis. Calyx campanulatus 6–7 mm. longus infra medium in lobos quinque subaequales lineari-lanceolatos fissus dense incano-patenti-pilosus glandulis circularibus sparse punctatus. Corolla calyce paullo longior circ. 8 mm. longa flavida; tubus vix exsertus extus glaber intus ad fauces albo-villosus; limbus bilabiatus; labium superum rotundatum circ. 2 mm. diametro emarginatum purpureo-tinctum extus glanduloso-punctatum atque villosulum, inferum 3-lobum basi sparse glandulosum pilis paucis conspersum. Stamina 4 inclusa filamentis glabris. Ovarium obovoideum glabrum stylo gracili 5 mm. longo, stigmate capitato. Drupa circ. 4 mm. longa siccitate nigra glabra bilocularis.

"Shrub of 2–3 ft. Flowers dull yellow. Open dry situations amongst rocks in the Mekong Valley, Yunnan. Lat. 27° 40′ N. Alt. 9000 ft. Aug. 1914." G. Forrest. No. 13,071.

Var. **meiophylla**, W. W. Sm. Var. nov.

Ramis gracilioribus, foliis multo minoribus inflorescentiis paucifloris recedit.

"Shrub of 2–3 ft. In fruit. Dry stony pastures in the Yangtze Valley at Taku, Yunnan. Lat. 27° 30′ N. Alt. 7000–8000 ft. Aug. 1914." G. Forrest. No. 13,049.

Premna yunnanensis, W. W. Sm. Sp. nov.

Species ex affinitate *P. nanae,* Coll. et Hemsl. a qua inter alia calyce infra medium fisso differt.

Fruticulus usque ad 2 m. altus erectus ramosus; rami

juniores dense incano-crispato-villosuli, tandem glabri cinerascentes. Folia siccando chartacea, vulgo 4–6 cm. longa, 1.5–3 cm. lata, ovata, apice obtusa vel breviter obtusiuscule acuminata, basi rotundata, crenato-serrata (nonnunquam irregulariter vel obscure), supra atro-viridia sparse pilosula, utrinque minute glandulosa, infra incano-pilosula, ad costam nervosque densius ; nervi utrinque 4–5 infra subconspicui ; petioli ± 1 cm. longi dense incano-villosuli. Cymae terminales subglobosae 1–2 cm. diametro densiflorae ± 12-florae pedunculis pedicellisque brevibus pilosis, bracteis bracteolisque linearibus 2–3 mm. longis. Calyx campanulatus ± 4 mm. longus infra medium in lobos quinque subaequales anguste triangulares vel sublineares fissus ± pilosus minute glandulosus. Corolla circ. 6 cm. longa pallide rosea ; tubus vix exsertus extus subglaber intus ad fauces capillis confervoideis subfusco-villosus ; limbus bilabiatus ; labium superum rotundatum circ. 4 mm. diametro extus glanduloso-punctatum atque villosulum, inferum 3-lobum. Stamina 4 inclusa filamentis supra glabris basi ipsa fusco-villosis. Ovarium obovoideum glabrum. Drupa vix matura circ. 4 mm. longa saepe bilocularis nigra glabra apice pilosulo excepto.

" Shrub of 4–5 ft. Flowers pale rose. Open dry situations amongst rocks on the Tong Shan in the Yangtze bend, Yunnan. Lat. 27° 20′ N. Alt. 9000–10,000 ft. Sept. 1913." G. Forrest. No. 11,240.

I take the following two sheets to represent the same species ; the leaves are smaller and the flowers not well developed :—

" Shrub of 4–6 ft. Flowers pale yellow. In open situations on the margins of thickets in the mountains of the Chungtien plateau, S.E. of Chungtien, Yunnan. Lat. 27° 45′ N. Alt. 10,000 ft. July 1913." G. Forrest. No. 10,527.

" Shrub of 4–5 ft. Flowers dull green. In open scrub in the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 10,000–11,000 ft. July 1913." G. Forrest. No. 10,351.

The calyx with lobes longer than the tube is rather remarkable for the genus. Closely allied are two other species from the same province. The calyx and fruit are much alike in all three, but there are considerable differences in the leaves and corolla. *P. mekongensis*, W. W. Sm. differs from *P. yunnanensis* in the more pilose leaves, deeper-cut calyx, and longer narrower corolla of a yellow colour. Its leaves are much affected by disease, and that may have had some influence on the hairiness. The third species, *P. acutata*, W. W. Sm., differs from the other two in the acuminate sharply-serrate leaves with a cuneate base and almost glabrous on both surfaces. Unfortunately flowers are lacking. The brief diagnosis above distinguishes it from *P. yunnanensis*.

Roscoea Humeana,* Balf. f. et W. W. Sm. Sp. nov.

Species affinis *R. Chamaeleoni*, Gagnep. sed habitu minus praecociore, floribus permagnis, labello lobis corollae lateralibus breviore inter alia signa divergit.

Herba perennis pro genere robusta ad 20 cm. alta. Radices fusiformes plurimae fasciculatae. Vaginae epigaeae 2–3 virides glabrae. Folia sub anthesi ± evoluta, nonnunquam paulo seriora, 4–6, late lanceolata vel ovato-lanceolata sessilia arcte imbricata basi longe vaginantia caulem omnino celantia, subacuta haud acuminata utrinque glabra 10–20 cm. longa usque ad 6 cm. lata. Spica 2–8-flora folia summa haud superans, sessilis nec ope pedunculi elevata; bracteae lanceolatae subacutae virides foliaceae glabrae ad 6 cm. longae. Flores violaceo-purpurei maximi. Calyx usque ad 10 cm. longus anguste tubulosus apice bilobulatus tenuiter membranaceus glaber. Corollae tubus nunc calycem aequans nunc triente longior; lobus posticus ± 4 cm. longus medio 3 cm. latus basi ± 8 mm. latus, erectus concavus apice rotundatus apiculatus; lobi laterales oblanceolati 4–4.5 cm. longi medio 1.5 cm. lati obtusiusculi; labelli limbus ad 2.5 cm. longus, circ. 3 cm. latus ambitu irregulariter subquadratus usque ad unguem rigidum 1.5 cm. longum fissus. Staminodia lateralia 1.7 cm. longa asymmetrice oblanceolata alba purpureo-tincta; filamentum erectum circ. 5 mm. longum ± 3 mm. latum canaliculatum; anthera ± 1.2 cm. longa basi in duo calcaria parallela 5 mm. longa viridi-lutea provecta. Stigma turbinatum pilosum; stylus ad 10 cm. longus; ovarium cylindricum glabrum circ. 1 cm. longum. Typi ex horto exsiccati in Herb. Edin. conservati.

West China:—Province of Yunnan. Cultivated in the Royal Botanic Garden from seeds secured by Mr. George Forrest. It flowered freely in June 1912, 1913, 1914, and 1915. It is the finest species as yet known in the genus, and apparently quite hardy. Its large flowers are of a beautiful violet to bluish-purple, and occur in compact spikes of 4–8 flowers at the same time as the leaves, occasionally to some extent precocious. The affinity of this plant is undoubtedly with *R. Chamaeleon*, Gagnep.; it differs from the plant described by Gagnepain in the less precocious habit, in the much larger flowers, and in the lateral lobes of the corolla exceeding the labellum, which has lobes oblique reniform and not lanceolate. K. Schumann in his Monograph of the Zingiberaceae (Engler's Das Pflanzenreich, 1904), p. 122, gives additional notes on the dimensions of Gagnepain's plant—calyx

* The specific name is given to keep in memory Private David Hume, 1st Batt. The Royal Scots, a young gardener of the staff of the Royal Botanic Garden, Edinburgh, who fell in action during the retreat from Mons on 26th August 1914.

3·5–4 cm. long, posterior lobe of corolla 1–1.2 cm. broad; the corresponding dimensions in *R. Humeana* are two to three times as great.

8301 **Salvia benecincta,** W. W. Sm. Sp. nov.

Inter species chinenses haec in vicinitatem *S. hiantis,* Royle ponenda; inflorescentiis prima aetate strobiloideis bracteis imbricatis fere celatis, postea bracteis conspicuis ornatis notanda.

Herba perennis 40–60 cm. alta. Caulis robustus ± dense fulvo-tomentellus. Folia basalia non visa; caulina superiora remota petiolo 4–10 cm. longo fulvo-tomentello suffulta; lamina 9–18 cm. longa, 4–10 cm. lata, ovato-lanceolata vel oblongo-lanceolata, apice obtusiuscula, basi subhastata vel cordatula, siccando papyracea, margine irregulariter crenata, supra ± pilosula, infra ad costam nervosque fulvo-tomentella, cetera minute pilosula. Inflorescentiae terminales et axillares 12 cm. longae vel paulo ultro pedunculo ± 12 cm. longo praeditae, racemiformes verticillastris 7–10 approximatis ± 4-floris compositae, prima aetate strobiloideae bracteis arcte imbricatis vestitae; rhachis dense fulvo-villosa; bracteae ad 2.5 cm. longae lanceolatae vel ± late ovatae, fulvo-pilosae atque ciliatae calycem semi-celantes; pedicelli ± 5 mm. longi dense pilosi. Calyx circ. 1.5 cm. longus campanulatus ad nervos dense glanduloso-pilosus; dentes inferiores ± 3 mm. longi triangulares apiculati, superiores in unum coaliti. Corolla ± 3 cm. longa ex collectore rubrida; tubus rectus calyce fere duplo longior dimidio inferiore cylindricus supra subabrupte ampliatus extus ± pilosulus; labium superius concavum circ. 5 mm. longum extus glanduloso-pilosum, inferius aequilongum trilobum lobis lateralibus parvis, mediano reniformi emarginato utrinque fere glabro. Stamina 2 tubo paululo exserta. Stylus inaequaliter bifidus.

Yunnan:—Mountain pastures near Lan-ngi-tsin. Alt. 10,000 ft. Flowers red. August. E. E. Maire. In Herb. Edin., No. 109 (anno 1914).

This species is readily distinguished from the Chinese members of the genus by the prominent bracts enclosing the young inflorescence and later more or less concealing the calyx.

6728 **Salvia grandifolia,** W. W. Sm. Sp. nov.

Species affinis *S. campanulatae*; Wall. a qua foliis multo majoribus, petiolis brevioribus dense ferrugineo-tomentosis, inflorescentiis late ramosis, floribus basi flavidis supra saturate purpureis inter alia differt.

Herba perennis ± 1 m. alta. Caulis robustus ± dense

glanduloso-hispidus. Folia permagna petiolo 4–7 cm. longo ad canaliculum dense ferrugineo-tomentoso petiolata (pro lamina breviter) ; lamina ad 35 cm. longa, ad 25 cm. lata, ambitu late ovata, apice rotundata, basi subrotundata vel late cuneata, margine remote sinuato-lobatula lobis rotundatis ± 4 cm. latis, papyracea, utrinque sparse paleaceo-pilosa ; caulina remota multo minora suborbicularia vel obovata, ± integra, sessilia vel fere sessilia. Inflorescentiae terminales 50 cm. longae vel ultro late paniculatae ; rami ramulique dense fulvido-pilosi atque glandulosi ; verticillastri remoti pauciflori saepe biflori ; bracteae ± 5 mm. longae ovatae vel lanceolatae pilosae ; pedicelli 1–2 mm. longi glanduloso-pilosi. Calyx ± 1.7 cm. longus campanulatus membranaceus dense glanduloso-pilosus ; dentes triangulares acuminati, anteriores circ. 4 mm. longi posteriores 3, circ. 2 mm. longi. Corolla fere 3 cm. longa basi flavida supra saturate purpurea ; tubus rectus calyce breviter exsertus superne sensim ampliatus infra glaber supra sparse glanduloso-pilosulus ; labium superius circ. 1.3 cm. longum concavum apice rotundatum extus dense glanduloso-pilosulum, inferius superiori ± aequilongum trilobum lobis rotundatis glabris vel extus sparse pilosulis. Stamina 2 exserta filamentis glabris, antheris 5 mm. longis. Nuculae ovoideae circ. 4 mm. longae brunneae.

" Plant of $2\frac{1}{2}$–$3\frac{1}{2}$ ft. Flowers—base dull yellow, apex deep purple-maroon. Open pasture on the margins of thickets in the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 10,000–11,000 ft. Sept. 1913." G. Forrest. No. 11,150.

This species is distinguished from its Chinese allies by the huge leaves with comparatively short petioles and the broad, much-branched inflorescence.

Salvia lichiangensis, W. W. Sm. Sp. nov.

Species ex affinitate *S. glutinosae,* Linn. a qua foliis multo majoribus ovalibus basi haud truncatis floribus pallido-purpureis inter alia valde divergit.

Herba perennis 50–60 cm. alta. Caulis robustus pilis longiusculis paleaceis articulatis dense vestitus. Folia basalia petiolo piloso 7–18 cm. longo suffulta ; lamina ± 20 cm. longa, 10–11 cm. lata, circumscriptione ovalis, apice basique ± rotundata, margine irregulariter crenata vel bicrenata, papyracea, utrinque sparse paleaceo-pilosa ; caulina remota plerumque 1–2 paria, minora, saepe cordatula, suprema nonnunquam sessilia. Inflorescentiae terminales ad 20 cm. longae racemiformes verticillastris ± 7 remotulis 4–8-floris compositae ; axis ut pedicelli ± 1 cm. longi, ut bracteae foliaceae ± 5 mm. longae,

ut calyx, pilis articulatis fulvidis dense obsita. Calyx 1–1.5 cm. longus campanulatus membranaceus fere ad medium bilabiatus fructu hians; dentes inferiores triangulares ± 3 mm. longi, superiores in unum biapiculatum connati. Corolla ± 3 cm. longa pallido-purpurea; tubus rectus calyce duplo longior superne sensim ampliatus subglaber; labium superius paululo concavum extus dense longiuscule villosum, inferius aequilongum trilobum lobis lateralibus extus villosis mediano majore rotundato emarginato glabro. Stamina 2 tubo paulo exserta. Stylus bifidus. Nuculae ovoideae = 3 mm. longae brunneae.

"Plant of 20–24 inches. Flowers pale purple. In open pine forests in the Lichiang Range, Yunnan. Lat. 27° 35′ N. Alt. 11,000 ft. June 1913." G. Forrest. No. 10,302.

3517 **Sedum Farreri,** W. W. Sm. Sp. nov.

Species affinis *S. algido,* Ledeb. sed petalis acuminatis flagellato-apiculatis margine erosulis differt; valde proxima *S. rarifloro,* N. E. Br. quod floribus laxissimis, sepalis patulis recedit, petalis subsimilibus gaudet.

Planta perennis radice crassa, caulibus numerosis annuis ascendentibus ± 12 cm. longis circ. 2 mm. latis glabris inflorescentia congesta terminatis. Folia alterna ± 1.5 cm. longa, circ. 3 mm. lata, linearia acuta glabra. Pedicelli circ. 3 mm. longi glabri. Flores conferti 6–10. Bracteae foliis similes, sed minores. Sepala 5 libera 7–8 mm. longa linearia acuta glabra. Petala 5 libera erecta ± 1.1 cm. longa, circ. 4 mm. lata, ovato-lanceolata acuminata flagellato-apiculata, in sicco tenuiter membranacea quasi-scariosa, margine erosula. Stamina 10, circ. 7 mm. longa. Carpella erecta staminibus subaequilonga.

"In the limestone screes at great elevations only, from the Min S'an Alps down to Thundercrown, at 12,000–14,000 ft. Kansu, West China. 28th Aug. 1914." Farrer and Purdom. No. 238.

This species is very closely allied to *S. rariflorum,* N. E. Br., which was obtained at 9000 ft. elevation in Chihli and described from a living plant sent to Kew in 1914. The petals in form suggest strongly the acuminate serrulate leaves of many mosses.

3515 **Sedum orichalcum,** W. W. Sm. Sp. nov.

Species foliis dense rosulatis ut in *Sempervivo,* inflorescentiis ramosis arcuato-cymosis, inter species chinenses distincta.

Planta 10–18 cm. alta rhizomate crasso radicibus multis fibrosis praedito. Caules 2–4 basi ascendentes mox erecti vel suberecti foliosi glabri. Folia basalia dense rosulata majora

3–4·5 cm. longa, ± 1 cm. lata, lanceolata vel ovato-lanceolata acuta basi rotundata sessilia, margine anguste scariosa nonnunquam minute erosula carnosa, siccitate plana, glabra; caulina laxe imbricata 1.5–2 cm. longa, lanceolata vel oblanceolata, sub insertionem in appendiculam rotundatam fere 2 mm. longam producta, ceterum basalibus subsimilia. Inflorescentiae plerumque tri-ramosae, saepe pluri-ramosae; ramuli multo arcuati 3–4 cm. longi complanati glabri floribus breviter pedicellatis fere continuo praediti; bracteae conspicuae 5–10 mm. longae, lanceolatae vel oblongae foliis caulinis haud dissimiles atque eodem modo basi appendiculatae; pedicelli 1–2 mm. longi. Flores flavi; sepala 5 lanceolato-deltoidea circ. 2–5 mm. longa. Petala lanceolata circ. 5–6 mm. longa apice acuta subindurata; stamina 10; squamulae minutae lineares; carpella 5–6. Fructus maturus deest.

"Plant of 4–7 inches. Flowers brassy yellow. Foliage succulent. On ledges of limestone cliffs in dry situations on the mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 10,000 ft. Sept. 1913." G. Forrest. No. 11,443.

A very distinct plant among Chinese and Himalayan species of *Sedum*; with the flowers of a *Sedum*, it has the habit of a *Sempervivum*; its strongly arcuate inflorescences are very striking.

3518 **Sedum Purdomii,** W. W. Sm. Sp. nov.

Species haec nana ex affinitate *S. Roborowskii*, Maxim. esse videtur.

Planta annua erecta humilis 4.5–5.5 cm. alta a basi ramosa vel simplex glabra. Folia sparsa carnosa laxe imbricata vel remotiuscula linearia ± 5 mm. longa vix 1 mm. lata obtusa. Bracteae foliis subsimiles. Inflorescentia trifida; cymulae 3–5-florae; pedicelli 1–4 mm. longi. Sepala basi libera ± 2 mm. longa oblonga obtusa viridia. Petala ± 5 mm. longa anguste oblanceolata obtusiuscula flava. Stamina petalis paululo breviora. Carpella infra connata staminibus paulo breviora.

"High alpine screes. 11,000–12,000 ft. Kansu, West China. Early August 1914." Farrer and Purdom. No. 238.

A dwarf floriferous annual. Of the N.E. Asiatic species the nearest affinity appears to be *S. Roborowskii*, Maxim. The material is unfortunately scanty, but does not match any species recorded from China or N.E. Asia.

44959 **Senecio glomeratus,** J. F. Jeff. Sp. nov.

Species valde affinis *S. glumaceo*, Dunn, qui foliis ovatis capitulis unifloris pappo rubrido separatur; a *S. triligulato*, Ham. absentia ligulorum inter alia recedit; haud procul a

S. diantho, Franch. qui forma texturaque foliorum satis discrepat.

Planta verisimiliter usque ad 1 m. alta; pars superior tantum adest. Caulis erectus flexuosus gracilis striatus sat foliosus tomento fulvo praesertim in parte suprema ± dense vestitus. Folia 6–24 cm. longa, 1.5–6 cm. lata, petiolo 1–2 cm. longo ± fulvo-tomentoso suffulta, late lanceolata acuminata basi cuneata margine crenato-serratula serraturis indurato-apiculatis, tenuiter membranacea supra sparse puberula vel scabridula infra pallidiora fere glabra nervis utrinque 8–9, subtus prominulis nervulis bene reticulatis. Inflorescentia ampla ramosa paniculata glomerulis contracto-corymbosis pedunculatis composita; glomeruli 1.5–2 cm. diametro 20–25 capitula gerentes, saepe 2–3 arcte compacti ramulos terminantes; pedunculi primarii ± 10 cm. longi, secundarii 5–15 mm. longi omnes fulvo-tomentosi; bracteae inflorescentiarum inferiores foliis similes sed minores. Capitula subsessilia 4–5-flora. Involucri tubulosi 3 mm. longi phylla majora 5 ovata subacuta brunnea marginibus subscariosis sparse puberula, basi phylla multo minora 5 subulata. Flores ligulati nulli; flores tubulosi 5–8 mm. longi aurantiaci (?). Achaenia 1.5 mm. longa linearia glabra pappo 4 mm. longo fragili albo praedita.

Near Tengyueh, Yunnan, 1911. Howell. No. 141.

Senecio incisifolius, J. F. Jeff. Sp. nov.

Species sectionis *Jacobaeae*, affinis *S. chrysanthemoidi*, DC.; habitu *S. nikoensem*, Miq. revocat; foliis pinnatisectis segmentis acutissimis conspicua.

Planta erecta gracilis circ. 75 cm. alta radicibus fibrosis praedita; caulis simplex striatus glaber supra sat foliosus infra defoliatus. Folia 9–10 cm. longa, 4–6 cm. lata, pinnatisecta jugis 3–4, segmentis ± oblongis acuminatis 2–3 cm. longis grosse dentatis, dentibus plerumque quinque, tenuiter membranacea utrinque glabra vel subglabra costa subtus sparse albo-pilosa excepta. Inflorescentia terminalis 5–7 cm. longa capitulis 15–30 mediocribus subumbellatim corymbosis composita; pedunculi 1.5–3 cm. longi fulvo-villosuli; bracteae inferiores foliis subsimiles sed multo minores, supra multo reductae lineares ± 1 cm. longae. Capitula (floribus radii inclusis) vix 1.5 cm. diametro; involucri phylla ± 5 mm. longa oblonga acuta vel subacuta libera paulo imbricata brunneo-scariosa glabra; flores radii 7–8, 6 mm. longi, 1 mm. lati, aurantiaci. Achaenia 1.5 mm. longa, oblonga sericeo-pubescentia pappo albo ± 5 mm. longo praedita.

Neighbourhood of Tengyueh, Yunnan, 1911. Howell. No. 17.

"Plant of 2½ ft. Flowers golden-yellow. Open moist pasture on the margins of thickets. Flanks of the Mingkwong Valley, Yunnan. Lat. 25° 20′ N. Alt. 7000–8000 ft. Oct. 1912." G. Forrest. No. 9292.

The inflorescence of this new species is very like that of *S. acerifolius*, C. Winkl., but the plants have very different leaves.

45019 **Senecio Latouchei**, J. F. Jeff. Sp. nov.

Species affinis *S. Oldhamiano*, Maxim. a quo rhizomate crasso perenni, foliis fere omnibus radicalibus suborbicularibus, inflorescentiis haud amplis inter alia differt.

Planta erecta vel suberecta flaccida 12–30 cm. alta rhizomate crasso apicem versus tomento flocculoso fulvo induto. Caulis gracillimus flexuosus striatulus infra primo ± dense fulvo-flocculoso-tomentosus supra sparse fulvo- vel albido-tomentellus mox glabrescens. Folia basalia plura ambitu suborbicularia basi cordata 1–3 cm. diametro margine (pro magnitudine grossius) dentata (fere sublobatula) dentibus indurato-apiculatis chartacea supra pilis multicellularibus adpressis fulvis subdense villosa infra tomento denso albido induta; nervi primarii 5–7 basi divergentes; petiolus 2–4 cm. longus ± dense fulvo-villosus; folia caulina superiora 1–2 suborbicularia vel rhomboidea 1.5–2 cm. diametro, petiolo 1–1.5 cm. longo auricula orbiculari caulem amplectante 3–7 mm. diametro praedita, cetera foliis basalibus subsimilia; in parte inferiore caulis plerumque folium solitarium auricula multo minore vel fere deficiente praeditum, cetera foliis basalibus simile. Inflorescentia corymbosa capitulis paucis 3–4, pro planta majusculis 2–2.5 cm. diametro; bracteae plures lineares vel subulatae circ. 5 mm. longae, raro majores specie magnitudineque in folia superiora transeuntes; involucri phylla 12–13, biseriata oblanceolata acuta vel subacuta 6–7 mm. longa 2 mm. lata pubescentia brunnea. Flores ligulati 11–13, flavidi, 1 cm. longi, 3 mm. lati; flores disci 30–35; corolla circ. 4 mm. longa; antherae ecaudatae. Achaenia 1 mm. longa compressiuscula puberula; pappus 3 mm. longus setosulus fragilis albus.

Province of Fukien, from Foochow to N.W. Fukien. J. de la Touche. No. 34.

Senecio palmatisectus, J. F. Jeff. Sp. nov.

Species sectionis *Cacaliae*, affinis *S. taliensi*, Franch., *S. cycloto*, Bur. et Franch., *S. Soulici*, Franch. quae omnes foliis valde recedunt; folia speciei novae eis *S. aconitifolii*, Turcz. simillima, flores omnino dissimiles.

Planta perennis 60–100 cm. alta rhizomate sat crasso radicibus numerosis fibrosis tomento fulvo plus minusve indutis. Caulis erectus teres striatulus glaber vel rarius sparse villosulus simplex nisi in regione inflorescentiae. Folia palmatisecta, ambitu perlate ovata, 5–10 cm. longa petiolo excluso, 7–12 cm. lata, basi cordata membranacea undique glabra vel rarius parce pubescentia; segmenta 5 angusta circ. 1 cm. lata acuta indurato-apiculata lobulis 2–4 fere angulo recto abeuntibus 2–4 cm. longis circ. 1 cm. latis; petiolus 1–5 cm. longus gracilis. Inflorescentia laxe paniculato-racemosa vel racemosa 15–30 cm. longa; capitula inter se remotiuscula 1.5 cm. longa, pedicellis 2–3 mm. longis bibracteolatis glabris, bracteolis 1–3 mm. longis linearibus. Involucri tubuloso-cylindrici circ. 8 mm. longi phylla 3–4, oblongo-linearia subobtusa glabra vel pubescentia marginibus angustis scariosis. Flores ligulati nulli; flores tubulosi 3–4 flavi circ. 8 mm. longi. Achaenia linearia 4–5 mm. longa striata glabra pappo 5–7 mm. longo fragili albo praedita.

N.W. Yunnan, 1907. Monbeig. No. 151.

Tsekou, N.W. Yunnan, 1912. Monbeig. No. 53.

Yunnan. On rocks in mountains near Lan-ngi-tsin. Alt. 9500 ft. Oct. 1914. E. E. Maire. No. 206.

45024 Var. **pubescens**, J. F. Jeff. Var. nov.

Typo foliis subtus pilis albidis crispatis ± parce praeditis.

Near Atuntsu, Mekong-Salween divide, Yunnan. In shady forest. 11,000–12,000 ft. July 1913. Kingdon Ward. No. 862.

45034 **Senecio solanifolius**, J. F. Jeff. Sp. nov.

Species sectionis *Jacobaeae*; speciei nulli chinensi illius sectionis propinqua est, sed foliis eis *Solani nigri*, Linn. subsimilibus facile recognoscitur.

Planta saltem 30 cm. alta; pars superior tantum visa. Caulis erectus teres gracilis circ. 2 mm. diametro strictus glaber sat foliosus supra parce ramosus ramulis pubescentibus. Folia 5–8 cm. longa petiolo excluso, 3–5 cm. lata, triangulari- vel ovato-lanceolata, acuta vel (suprema) acuminata basi truncatula, margine subobscure sinuato-dentata, in sicco membranacea, supra atroviridis glabra infra pallidiora ad costam sparse puberula nervis supra obscuris infra paulo distinctis; petiolus 1–2 cm. longus. Inflorescentia terminalis corymbosa capitulis 3–4 composita; axis inflorescentiae 3–5 cm. longus fulvo-puberulus; pedunculi 1–1.5 cm. longi, basi bractea lineari 3–4 mm. longa praediti. Capitula 1.5 cm. longa, 2.5 cm. lata; involucri phylla majora circ. 13, uniseriata 6–7 mm. longa lanceolata acuta glabra trinervia marginibus membranaceis,

basi ipsa phylla minora ± 8 subulata, 2–3 mm. longa. Flores radii 7–8, circ. 1 cm. longi oblongi apice subobtusi obscure trifidi 4–5-nervii flavidi; flores disci perplurimi 7 mm. longi pappo 6 mm. longo molli albo praediti. Antherarum cellulae ecaudatae. Achaenia lineari-oblonga circ. 3 mm. longa paulo complanata striis hirsutulis praedita.

Province of Fukien between Foochow and N.W. Fukien. 1914. J. de la Touche. No. 126.

1939 **Sterculia platanifolia,** Linn. var. **major,** W. W. Sm. Var. nov.

A typo foliis subtus dense molliterque tomentosis, fructibus multo majoribus ad 13 cm. longis ad 4.5 cm. latis, seminibus ± 1.3 cm. longis recedit.

"Shrub of 25–30 ft. In fruit. In thickets on the Tong Shan in the Yangtze bend, Yunnan. Lat. 27° 20′ N. Alt. 9000–10,000 ft. Aug. 1913." G. Forrest. No. 10,820.

265 **Styrax fukienensis,** W. W. Sm. et J. F. Jeff. Sp. nov.

Species ex affinitate *S. philadelphoidis*, Perk. et *S. confusi*, Hemsl.

Frutex?; ramuli teretes, juniores dense fulvo-stellato-tomentosi demum glabrescentes. Folia alterna petiolo 3–5 mm. longo dense fulvo-stellato-tomentoso petiolata, oblonga vel ovato-oblonga, 6–8 cm. longa, 2.5–3.5 cm. lata, apice breviter acuminata vel acuta vel subobtusa, basi subrotundata vix cuneata margine minute indurato-denticulata, tenuiter coriacea supra sparse fulvo-stellato-tomentosa, ad costam dense, subtus vix densius quam supra, nervis 5–6-paribus supra paullo eminentibus sat conspicue reticulatis subtus manifeste prominentibus. Flores in racemum 5–6 cm. longum, 5–6-florum terminalem dispositi atque in foliorum axillis 1–2-fasciculati; rhachis inflorescentiae dense fulvo-stellato-tomentosa; bracteae 2–3 mm. longae lineares; flores circ. 1.6 cm. longi pedicello 7–9 mm. longo dense stellato-tomentoso suffulti. Calyx cupuliformis papyraceus 6–7 mm. altus, ore in sicco complanatus circ. 6 mm. latus, extus dense fulvo-stellato-tomentosus intus glaber margine truncato hic illic glandulis capitatis ornato, denticulis 5 distinctis praeditus. Corolla 5-partita, tubo circ. 3.5 mm. alto extus tomentoso basi ipsa excepta, intus glabro, lobis in aestivatione valvatis 12 mm. longis 2.5–3 mm. latis extus dense albido-tomentosis intus glabris apice tomentello excepto. Stamina 10, filamentis parte libera ad 3 mm. longis basi lanato-tomentosis apice glabris, antheris 6–7 mm. longis margine pilis stellatis conspersis. Ovarium superum ovoideum multiovulatum dense longiuscule albo-pilosum; stylus glaber quam corollae lobi paululo longior.

In the north-west of the Province of Fukien. Coll. J. de la Touche. No. 149.

The species is closely allied to *S. confusus*, Hemsl. and to *S. philadelphoides*, Perk., but agrees with neither of them as represented by type sheets at Kew. In the details of their floral structure the three species are very much alike.

709 **Syringa Adamiana,*** Balf. f. et W. W. Sm. Sp. nov.

Species ex affinitate *S. villosae*, Vahl a qua inflorescentiis crebre hirsutulis, floribus pallido-roseis ore albis, calycibus truncatis vix denticulatis recedit ; valde affinis *S. villosae*, Vahl, var. *hirsutae*, C. Schn., plantae koreano-mandschuricae ; apud plantas szechwanenses haud procul a *S. Wilsonii*, Schn. quae ramulis inflorescentiisque glabris inter alia divergit.

Frutex in cultura 2–3-metralis. Ramuli annotini rotundati sat crassi olivacei crebre patenti-hirsutuli, lenticellis multis parvis pustulosis notati, hornotini cinerascentes glabri. Folia plerumque 7–12 cm. longa, 3–6 cm. lata, elliptico-lanceolata vel elliptico-oblonga, apice acuta vel modice acuminata, basi ± rotundata vel late cuneata, textura ut in *S. villosa*, supra saturate viridia glabra, margine ciliolata, infra pallidiora ad costam nervosque longiuscule hirsuta, caetera glabra ; petioli 1–1.5 cm longi sparse hirsuti vel glabrescentes. Inflorescentiae mediocres (adhuc in cultura) 12–15 cm. longae 7–8 cm. latae, subsimiles eis *S. Wilsonii*, Schn., ramulis densiuscule hirsutulis. Flores suaveolentes pallido-rosei, ore albi. Calyx 2 mm. longus sparse pilosulus truncatus vix denticulatus viridis apicem versus pellucidus roseo-suffusus. Corollae tubus 8–9 mm. longus apicem versus paulo dilatatus, laciniae ovatae obtusiusculae 2 mm. vix. superantes erectae serissime patentes. Antherae faucem haud attingentes flavidae. Stylus circ. 2.5 mm. longus. Fructus non visus.

West China :—Province of Szechwan. Cultivated in the Royal Botanic Garden, Edinburgh, from seed collected by Mr. C. M. Watson near Tatsienlu. Types taken from the garden specimens are preserved in the Herbarium of the Royal Botanic Garden. It flowered freely in June 1915. A graceful species and of value for its late flowering. It belongs to the group *Villosae* and is closely akin to *S. villosa*, Vahl, especially to the Corean and Manchurian variety of that species known as var. *hirsuta*, Schn. In habit and appearance

* By the specific name it is desired to hold in memory Private Thomas Adam, 2nd Scots Guards, a gardener of the staff of the Royal Botanic Garden, Edinburgh, **who fell in action in Flanders on 16th May 1915.**

it resembles *S. Wilsonii*, Schn., which differs in the glabrous inflorescence and in the size and shape of the corolla-lobes.

733 **Syringa pinetorum**, W. W. Sm. Sp. nov.

Species foliis parvis ex affinitate *S. microphyllae*, Diels; petiolis brevioribus calyce longiuscule dentato glabro dentibus ciliolatis exceptis inter alia recedit.

Frutex 1–3 m. altus; ramuli juniores dense patenti-incano-pilosi, vetustiores sero glabrescentes grisei. Folia 2–3.5 cm. longa 1–1.5 cm. lata, ovata, rarius lanceolato-ovata vel subelliptica, apice acuta rarius obtusa, basi plus minusve rotundata, supra sparse pilosa vel glabra, margine ciliolata, subtus pallidiora, ad costam nervosque longiuscule albo-pilosa, caeterum glabra; nervi 3–4 paria subtus conspicui bene reticulati; petioli 2–5 mm. longi pilosi. Inflorescentiae 10–18 cm. longae, 7–8 cm. latae, erectae sublaxiflorae ± dense albo-pilosae; pedicelli brevissimi circ. 1 mm. longi vel fere nulli; flores pallido-lavendulaceo-rosei ex collectore. Calyx circ. 2 mm. longus ad tertiam vel quartam partem in dentes triangulares divisus glaber dentibus ciliolatis exceptis. Corollae tubus 8–9 mm. longus apicem versus paullulo dilatatus; laciniae oblongae obtusiusculae 3 mm. longae. Antherae parte superiori tubi insertae sed corollae fauces vix attingentes. Fructus deest.

"Shrub of 4–8 ft. Flowers pale lavender-rose. In open pine forests on the Lichiang Range, Yunnan. Lat. 27° 40′ N. Alt. 10,000–11,000 ft. June 1914." G. Forrest. No. 12,472.

734 **Syringa Wardii**, W. W. Sm. Sp. nov.

Species ex affinitate *S. oblatae*, Lindl. et *S. affinis*, Henry; ab ambabus foliis multo minoribus apice vulgo rotundatis inter alia discrepat.

Arbuscula vel frutex 3–5 m. altus; ramuli juniores dense incano-pubescentes vetustiores glabrescentes grisei. Folia ramulorum floriferorum 1–2 cm. longa 1–2 cm. lata, suborbicularia vel perlate ovata, apice rotundata vel obtusa, basi ± rotundata supra atroviridia glabra subtus pallidiora glabra vel subglabra nervis gracilibus bene reticulatis; petioli 2–3 mm. longi minute pubescentes vel glabrescentes. Inflorescentiae circ. 10 cm. longae circ. 7 cm. latae erectae sublaxiflorae dense albo-pubescentes minute glandulosae; pedicelli 1–3 mm. longi pubescentes minute nitenti-glandulosi; flores siccitate pallidi. Calyx circ. 2 mm. longus glaber vel subglaber sparse minute glandulosus ore truncato dentibus minutis vel fere nullis. Corollae tubus 9–13 mm. longus supra medium dilatatus; laciniae ovatae obtusae ± 4 mm. longae. Antherae paulo supra medium

tubum insertae apicibus 2–3 mm. a faucibus corollae remotis. Fructus deest.

" Small tree or shrub of 10–15 ft. At Tungchuling, Yunnan, in the arid region at 10,000 ft." Kingdon Ward. No. 312.

The collector notes that the same plant is found in the Mekong Valley and near Atuntsu at 12,000 ft.

4552 **Tanacetum aureoglobosum,** W. W. Sm. et Farrer. Sp. nov.

Species affinis *Tanaceto nubigeno*, Wall., a quo habitu nano ramosissimo foliis capitulisque minoribus valde recedit.

Planta nana globoso-caespitosa vix 8 cm. superans, radicibus multis crassis ramosis intertextis praedita. Caules perplurimi ramosi infra defoliati supra sat foliosi in massam globosam conferti undique minute incano-tomentelli. Folia parva ± 5 mm. longa incano-tomentella petiolo 2–3 mm. longo suffulta pinnatim dissecta segmentis primariis 2–3-jugis in lobulos vulgo tres lineares subteretes ± 1 mm. longos divisis. Capitula folia paululo superantia apices ramulorum versus 5–6-aggregata, pedunculis 2–3 mm. longis incanis suffulta, circ. 3 mm. longa; involucri phylla ± 15 lanceolata vel oblonga ± 2 mm. longa tenuiter membranacea margine scariosa incano-pilosa. Flores flavi in capitulo 15–20, minimi heterogami 3–4 mm. longi extus sparse pilosuli glandulosi. Achaenia (immatura) oblonga minute pilosula vel glabra 1 mm. longa pappo deficiente.

" A charming wee dome of fine grey, turning a solid ball of gold in Oct.–Nov. From the same aspects and regions as No. 103, usually on slopes of harder caky loëss loam less charged with shingle. Kansu, West China." Farrer and Purdom. No. 320.

A very distinct little species.

4553 **Vaccinium mekongense,** W. W. Sm. Sp. nov.

Species affinis *V. salwenensi*, W. W. Sm. a quo foliis minoribus, inflorescentiis brevioribus, bracteis conspicuis, calycis lobis triangularibus acutis, corolla globosiore discriminatur.

Frutex .6–1.6 m. altus ramosus ramulis primum glanduloso-pilosis tandem glabrescentibus cinerascentibus. Folia petiolo ± 2 mm. longo pilosulo suffulta; lamina 2–3 cm. longa, ± 1 cm. lata, oblongo-lanceolata vel subelliptica, apice acuta vel raro (in eodem specimine) obtusa, calloso-apiculata, basi ± late cuneata vel subrotundata, margine crebre calloso-serrulata, papyracea, paginis fere concoloribus olivaceis superiore ad costam parce pilosula, inferiore sparse albo-pilosa vel glabrescente, nervis utrinque visibilibus sed haud conspicuis. Inflorescentiae axillares racemosae numerosae subdensiflorae 3–5 cm. longae pilis glanduloso-capitatis mediocriter vestitae;

bracteae bracteolaeque 3–5 mm. longae lanceolatae vel lineari-lanceolatae inter flores apertos conspicuae glabrae vel ciliolatae rubridae ; pedicelli ± 1 mm. longi. Calyx purpureus ; tubus cum ovario glaber vel sparsissime pilosulus ± 1 mm. longus, lobi ± 1 mm. longi triangulares acuti glabri vel pilis minimis parce conspersi. Corolla circ. 4 mm. longa urceolata albida roseo-striata extra glabra intus albido-pilosa lobis brevibus recurvis. Stamina circ. 2 mm. longa filamentis dense pilosulis antheris exaristatis. Fructus deest.

"Shrub of 2–5 ft. Flowers creamy-white, striped rose. Open situations on the Yungchang-Mekong divide, Yunnan. Lat. 25° 15′ N. Alt. 7000–8000 ft. May 1913." G. Forrest. No. 9887.

4954 **Vaccinium salweenense,** W. W. Sm. Sp. nov.

Species affinis *V. Doniano,* Wight a quo habitu humiliore ramulis haud glabris foliis minoribus lanceolatis antheris exaristatis differt ; ab *V. exaristato,* Kurz habitu, foliis minoribus textura tenuioribus, floribus saturate roseis recedit ; ab *V. fragili,* Franch. ramulis foliisque multo minus pilosis, calycis tubo glabro, filamentis brevioribus antheris exaristatis inter alia signa distinguenda.

Frutex ± 1 m. altus ramulis substrictis gracilibus primo ± dense fulvido-pilosulis mox sparsim, tandem glabrescentibus. Folia petiolo 2–3 mm. longo pilosulo mox glabrescente suffulta ; lamina ± 3.5 cm. longa, 1.2–1.5 cm. lata, lanceolata, apice acuta vel breviter acuminata, basi ± late cuneata vel subrotundata, margine regulariter calloso-serrulata, tenuiter papyracea, supra atroviridis ad costam minute pilosula vel glabrescens, infra pallidior ad costam nervosque sparse pilosa tandem fere glabra, nervis siccitate utrinque subconspicuis. Inflorescentiae axillares racemosae numerosae laxiflorae 5–7 cm. longae mediocriter pilosae ; bracteae bracteolaeque 2–4 mm. longae lanceolatae vel lineari-lanceolatae tempore florendi inconspicuae pilosulae vel glabrae rubridae ; pedicelli ± 2 mm. longi. Calyx purpureus ; tubus cum ovario glaber ± 1 mm. longus, lobi ± 1 mm. longi ovato-triangulares apiculati margine ciliolati. Corolla 4–5 mm. longa urceolata saturate rosea extra glabra, intus albido-pilosa lobis brevibus erectiusculis. Stamina circ. 2.5 mm. longa filamentis dense pilosulis antheris exaristatis. Fructus deest.

"Shrub of 2–4 ft. Flowers deep rose. Open grassland on the Salween-Yungchang divide above Pu-piao, Yunnan. Lat. 25° 10′ N. Alt. 7000–8000 ft. May 1913." G. Forrest. No. 9867.

4538 **Vaccinium scopulorum,** W. W. Sm. Sp. nov.

Species affinis *V. serrato,* Wight, a quo habitu graciliore, ramulis dense hispidis, foliis minoribus nunquam verticillatis, inflorescentiis axillaribus per caulem distributis nec apicem versus congestis, staminum filamentis pilosulis inter alia signa minora divergit.

Frutex 1–1.5 m. altus ramulis elongatis gracilibus primo dense setoso-hispidis. Folia subsessilia 3–4 cm. longa, 1–1.5 cm. lata, lanceolata vel ovato-lanceolata vel elliptico-lanceolata, apice acuta calloso-apiculata, basi cuneata, margine remote serrulata, utrinque glabra, supra atroviridia infra olivacea, nervis utrinque subconspicuis. Inflorescentiae axillares racemosae numerosae per caulem distributae effusiores ± 5 cm. longae, 10–20-florae glabrae ; bracteae ± 1 mm. longae lineari-lanceolatae glanduloso-ciliatae, erga basim racemorum aggregatae imbricatae, supra remotae ; pedicelli 1–2 cm. longi patentes. Calycis lobi triangulares circ. 1.5 mm. longi, purpurei glabri vel subglabri ; ovarium circ. 1.5 mm. longum. Corolla circ. 5 mm. longa suburceolata extra minute puberula viridi-flava vel viridi-albida apice kermesina ; lobi parvi recurvi. Stamina persimilia eis *V. serrati,* sed filamentis pilosulis praedita. Fructus vix maturus globosus 4–5 mm. diametro, in scheda niger.

"Shrub of 5 ft. Flowers greenish-white tipped crimson, fragrant. On shady rocks and cliffs on the hills to the northwest of Tengyueh, Yunnan. Lat. 25° 10′ N. Alt. 6000 ft. March 1913." G. Forrest. No. 9788.

"Shrub of 2–5 ft. In seed. On cliffs amongst scrub on hills west of Tengyueh. Lat. 25° N. Alt. 6000 ft. May 1912." G. Forrest. No. 7559. June 1912. No. 8073.

"Evergreen shrub of 2–3 ft. Flowers yellowish-green, tipped crimson-maroon. Open situations amongst scrub and on humus-covered boulders on the Shweli-Salween divide. Lat. 25° N. Alt. 9000 ft. April 1914." G. Forrest. No. 12,313.

A near ally of the Himalayan and Khasian *V. serratum,* Wight ; at first sight very distinct, but in the structure of the flower approaching very closely.

4565 **Vaccinium spicigerum,** W. W. Sm. Sp. nov.

Species affinis *V. fragili,* Franch. a quo habitu diverso, ramulis dense fulvido-tomentosis, petiolis longioribus, foliis ad 6 cm. longis lanceolatis longiuscule acuminatis, inflorescentiis spiciformibus bracteis inconspicuis, calyce incano-tomentoso discriminatur ; quoad floris structuram valde appropinquat.

Frutex 1–5 m. altus ramosus ramulis patentibus primum dense fulvido-tomentosis tandem glabrescentibus. Folia petiolo

ad 5 mm. longo ± tomentoso praedita ; lamina vulgo 4–6 cm. longa, 1.5–2 cm. lata, lanceolata, apice longiuscule acuminata calloso-apiculata, basi cuneata, margine crebre serrulata serraturis minute apiculatis, papyracea, paginis siccitate subconcoloribus glabris costa minute pilosula excepta. Inflorescentiae axillares vel pseudo-terminales foliis ramulorum floriferorum nonnunquam omnino delapsis spiciformiter racemosae numerosae ± 3 cm. longae dense incano- vel fulvido-tomentellae ; bracteae bracteolaeque 1–3 mm. longae ± lineares inconspicuae tomentellae ; pedicelli ± 1 mm. longi incani. Calyx vix 2 mm. longus dense incano-tomentosus ; lobi ovati ± acuti fere 1 mm. longi. Corolla circ. 5 mm. longa urceolata alba, saepe roseo-suffusa, glabra lobis brevibus recurvis. Stamina circ. 3 mm. longa eis *V. fragilis* similia, filamentis pilosulis, antheris dorso breviter biaristatis. Fructus deest.

" Shrub of 10–15 ft. Flowers pure white, fragrant. Amongst scrub on the hills at the north end of the Tengyueh Valley, Yunnan. Lat. 25° N. Alt. 7000 ft. May 1912." G. Forrest. No. 7637.

" Shrub of 2–4 ft. Flowers white, tinged rose. Amongst scrub on the divide between the Shweli (Lungchiang) and Tengyueh Valleys, Yunnan. Lat. 25° N. Alt. 6000–7000 ft. May 1912." G. Forrest. No. 7841.

" Shrub of 3–4 ft. Flowers white flushed rose. Open dry situations on the margins of thickets on the Shweli-Salween divide. Lat. 25° 20′ N. Alt. 9000 ft. June 1913." G. Forrest. No. 12,060.

Small tree ; among scrub in mountains near Kiao-mé-ti, Yunnan. Alt. 10,000 ft. Maire. No. 671 in Herb. Edin. (anno 1914).

This new species shows close relationship with the less hairy forms of *V. fragile*, Franch., such as the variety known as *myrtifolia*, but the points of difference are too many to permit of its being attached to that species as a variety.

343 **Viburnum adenophorum,** W. W. Sm. Sp. nov.

Species affinis *V. Mullahae*, Ham. et *V. hirtulo*, Rehder sed foliis subtus glanduligeris, inflorescentiis tomento denso fulvo indutis inter alia signa recedit.

Frutex erectus ramulis primo fulvo-tomentosis atque sparse setosis. Folia petiolo ± 1 cm. longo tomentoso atque setoso praedita ; lamina late ovata, 6–8 cm. longa, 3–5.5 cm. lata, basi ± rotundata, apice acuminata, margine serrata, membranacea, supra atro-viridis pilis furcatis sparse praedita subtus pallidior ad costam nervosque sparse pilosula glandulis minutis rotundatis nitentibus conspersa ; nervi utrinque 7–8 subparalleli usque

ad dentes stricte excurrentes ; stipulae nullae. Inflorescentiae corymbosae 5–8 cm. diametro ubique tomento denso fulvo indutae pedunculis ± 2 cm. longis, radiis primariis plerumque 7. Calycis lobi triangulares vix 0.5 mm. longi dense tomentosi. Corolla alba rotata circ. 5 mm. diametro, ± 2.5 mm. alta, extra tomentosa intra glabra, sub medium in lobos orbiculares fissa. Stamina corollam paulo superantia. Ovarium circ. 2 mm. longum setulis fasciculatis dense tomentosum. Fructus deest.

Shrub with caducous foliage, white flowers, among scrub on hills near Long-ky, Yunnan. Alt. 2300 ft. June. Maire. No. 94 in Herb. Edin.

A species of the group *Odontotinus* and closely allied to *V. Mullaha*, Ham. (=*V. stellulatum*, Wall.) and *V. hirtulum*, Rehder. It is easily distinguished by the minute shining glands on the under surface of the leaf, and by the smooth fulvous tomentum of the inflorescence.

974 **Viburnum brachybotryum,** Hemsl. var. **tengyuehense,** W. W. Sm. Var. nov.

A typo recedit petiolis stellato-puberulis, foliis subtus ad axillas venarum albo-tomentellis, inflorescentiis fructiferis ± effusis, stylo brevi calycis lobos haud superante.

"Shrub of 6–12 ft. In fruit. Amongst scrub in open situations on the divide between the Shweli and Tengyueh Valleys. Lat. 25° N. Alt. 7000 ft. June 1912." G. Forrest. No. 8216.

"Shrub of 4–5 ft. In fruit. Open situations amongst scrub in the hills to the north-east of Tengyueh, Yunnan. Lat. 25° 10′ N. Alt. 6000–7000 ft. July 1912." G. Forrest. Nos. 8756, 8770.

Very near the Hupeh plant, but differing in the more hirsute shoots, the stellately pubescent petioles, in the tufts of hairs in the axils of the veins, and in the short style.

975 **Viburnum Dalzielii,** W. W. Sm. Sp. nov.

Species affinis *V. hirtulo*, Rehder, a quo foliis subcoriaceis acuminatis cordatulis 7–10 cm. longis, nervis 6–12 paribus, corymbis subsessilibus inter alia differt.

Frutex ramulis primo dense fulvo-setosis tandem glabris cinereis. Folia petiolo ± 1 cm. longo dense fulvo-setoso suffulta ; lamina ovato-lanceolata, 8–10 cm. longa, 3–4 cm. lata, basi cordatula, apice breviter acuminata, margine remote atque minute denticulata, supra atroviridis parce pilosula vel glabrescens nisi ad costam nervosque impressos fulvo-setosulos,

infra pallidior minute punctulata glabra nisi ad costam nervosque eminentes longiuscule fulvo-setosos; nervi utrinque 6–12 ad marginem excurrentes; stipulae nullae. Corymbus ± 5 cm. diametro, subsessilis, pedicello 1 cm. haud superante dense fulvo-setosulo, radiis primariis plerumque 5; flores e radiis ordinis tertii vel quarti nati. Calycis lobi triangulares 0.5 mm. longi cum ovario fulvo-setosuli. Corolla albida rotata 4–5 mm. diametro, extra setosula, ad duas partes in lobos suborbiculares fissa. Stamina corollam paulo superantia. Stylus brevis calycis lobis brevior. Fructus circ. 8 mm. longus, circ. 6 mm. latus, multo compressus apice hirsutulus.

"Near Thaiyong, a mountain valley sixty miles west from the port of Swatow, China." Coll. Dr. J. M. Dalziel. Nos. 170, 171 in Herb. Edin.

The nearest affinity of this plant appears to be *Viburnum hirtulum*, Rehder. The much-compressed fruit with one side slightly concave suggests that of *V. sempervirens*, C. Koch.

922 **Viburnum erubescens,** Wall. var. **carnosulum,** W. W. Sm. Var. nov.

A typo recedit foliis carnosulis haud membranaceis apice basique plerumque cuneatis, nervis obscurioribus, pedunculis brevioribus, inflorescentiis magis congestis.

"Shrub of 1–5 ft. Flowers pale shell pink, fragrant. Dry stony situations on the divide between the Sha-yang and Chutong Valleys, Yunnan. Lat. 25° 20′ N. Alt. 6700 ft. April 1910." G. Forrest. No. 5520.

"Shrub of 8–20 ft. In fruit. Open situations amongst scrub in side valleys on the hills to the east of Tengyueh, Yunnan. Lat. 25° N. Alt. 6000 ft. May 1912." G. Forrest. No. 7955.

"Shrub of 6–10 ft. Flowers white, faintly flushed dull crimson on exterior, fragrant. Open scrub on the hills west of Tengyueh. Lat. 25° N. Alt. 7000 ft. March 1913." G. Forrest. No. 9808.

"Shrub of 3–6 ft. Flowers white, rose exterior, fragrant. Amongst scrub on the Shweli-Salween divide, Yunnan. Lat. 25° 5′ N. Alt. 6000 ft. May 1913." G. Forrest. No. 9864.

Another form of this most variable species which has a range from Ceylon through the Deccan to the Himalaya, Burma, and Western China.

Viburnum erubescens, Wall. var. **limitaneum,** W. W. Sm. Var. nov.

A typo recedit foliis ovalibus apice ± rotundatis nec acuminatis nec acutis, pedunculis gracilibus, inflorescentiis paucifloris congestis.

"Shrub of 6–12 ft. In fruit; fruit dull red. In thickets on the outskirts of the lava-bed west of Tengyueh, Yunnan. Lat. 25° N. Alt. 5000 ft. May 1912." G. Forrest. No. 7753.

"Bushy shrub of 5–8 ft., growing by stream in the open or in shade of bamboo thickets. Flowers pink in bud, white when open. Alt. 8000 ft. June 1914. Feng-shiu-ling Camp, Upper Burma, near the Chinese frontier." Kingdon Ward. No. 1658.

Viburnum flavescens, W. W. Sm. Sp. nov.

Species affinis *V. ovatifolio*, Rehder, ejusque sociis; foliis breviter stipulatis utrinque pubescentibus plerumque medio latissimis, petiolo 1–1.5 cm. longo, floribus flavidis, ovario ± sparse stellato-pubescente glanduloso dignoscenda.

Frutex 2–7 m. altus ramulis stellato-puberulis tandem glabris cinerascentibus. Folia petiolo 1–1.5 cm. longo sparse stellato-puberulo suffulta; lamina 4–8 cm. longa, 3–5 cm. lata, rhomboidea vel rhombico-ovata vel latiuscule ovata, medio latissima, basi ± rotundata, apice acuminata, serrata, in sicco membranacea, supra pilis furcatis bene conspersa, subtus ad costam nervosque sparse pilosula, ad axillas nervorum albo-tomentella, caeterum glabra vel subglabra; nervi utrinque 5–7 subparalleli, ad dentes excurrentes; stipulae minimae subulatae. Corymbus terminalis 5–6 cm. diametro, pedunculo 1–1.5 cm. longo sparse puberulo suffultus, radiis primariis 5–7 minute stellato-puberulis atque glandulosis, floribus e radiis ordinis tertii vel quarti natis. Calycis lobi circ. 0.75 mm. longi triangulares cum ovario 3 mm. longo oblongo sparse stellato-pubescentes. Corolla rotata circ. 7 mm. diametro ad duas partes in lobos ovatos obtusos divisa utrinque glabra flavida. Stamina corollam dimidio superantia fere 5 mm. longa. Drupa deest.

"Shrub of 6–10 ft. Flowers deep creamy-yellow, faintly fragrant. Dry open situations amongst scrub on the eastern flank of the Lichiang Range. Lat. 27° 10′ N. Alt. 9000–10,000 ft. May 1910." G. Forrest. No. 5551.

"Shrub of 10–20 ft. Flowers creamy-yellow. In thickets and mixed forests on the eastern flank of the Lichiang Range. Lat. 27° 15′ N. Alt. 10,000–11,000 ft. June 1910." G. Forrest. No. 5789.

This species is distinguished from *V. ovatifolium*, Rehder, by the shape of the leaf and the long stamens, from *V. betulifolium* Batal. and *V. lobophyllum*, Graebn. by the leaves pubescent on both sides and of different shape; from *V. dasyanthum*, Rehder, and *V. hupehense*, Rehder, by the glabrous corolla. The leaves suggest those of *V. dilatatum*, Thunb.

Viburnum odoratissimum, Ker, var. **conspersum,** W. W. Sm. Var. nov.

A typo recedit ramulis inflorescentiisque sparse stellato-puberulis, foliis ovalibus apice plerumque rotundatis utrinque primo ad costam sparse fulvo-stellato-puberulis, petiolis primo densiuscule stellato-puberulis mox glabrescentibus.

"At Thaiyong, a mountain valley, 2000 ft. elevation, sixty miles west from the port of Swatow, surrounded by hills and intersected by glens richly wooded. Sept. 1898." Coll. Dr. J. M. Dalziel. No. 174.

Viburnum propinquum, Hemsl. var. **Mairei,** W. W. Sm. Var. nov.

A typo clare differt foliis multo minoribus 3–4.5 cm. longis, multo angustioribus, 1–1.2 cm. latis, lineari-lanceolatis, apice acutis nec acuminatis, basi anguste cuneatis, inflorescentiis minoribus 2–4 cm. latis, fructibus 3–4 mm. vix superantibus.

This plant differs very much from the typical plant as seen in specimens from the province of Hupeh. The species is, however, very variable, and a small-leaved form with short globose fruits has been described from Szechwan—*V. propinquum,* Hemsl., var. *parvifolium,* Graebner. In this variety the leaves do not exceed 4 cm. and the fruit is about 3 mm. long; it differs, however, from var. *Mairei* in the ovate acuminate leaves.

Viburnum thaiyongense, W. W. Sm. Sp. nov.

Species ex affinitate *V. Mullahae,* Ham., *V. brevipedis,* Rehder, *V. Fordiae,* Hance, et *V. hirtuli,* Rehder; petiolis brevissimis, foliis ellipticis apice basique ± rotundatis utrinque ± pilosulis recedit.

Frutex ramulis primo pilis fasciculatis dense fulvo-tomentosis tarde glabrescentibus. Folia petiolo 3–5 mm. longo dense tomentoso suffulta; lamina 4–5 cm. longa, 3–3.5 cm. lata, ± late elliptica, basi rotundata, apice rotundata vel obtusa, margine remote atque irregulariter dentata vel denticulata, crasse papyracea, supra atroviridis pilis furcatis vel fasciculatis conspersa, ad costam impressam nervosque fulvo-setosula, infra pilis fasciculatis ± dense fulvo-tomentosa; nervi utrinque plerumque 5 subparalleli ad dentes excurrentes; stipulae nullae; nonnunquam folium parvum quasi stipulare e gemma axillari enatum. Corymbus terminalis circ. 5 cm. diametro, pedunculo 1–1.5 cm. longo tomentoso suffultus, radiis primariis 5–6 fulvo-tomentosis, floribus e radiis ordinis tertii vel quarti natis; radii secundarii ad ultimos longiuscule pilosi bracteis linearibus

pilosis praediti. Calycis lobi 0.5 mm. longi triangulares extra longiuscule pilosi. Corolla rotata 4 mm. diametro ad duas partes in lobos suborbiculares divisa glabra vel extra parce pilosula. Stamina 3 mm. longa corollam paululo superantia. Stylus brevis calycis lobos subaequans. Ovarium longe pilosum. Fructus deest.

"At Thaiyong, a mountain valley, 2000 ft. elevation, sixty miles west of the port of Swatow, China. Aug. 1897." Coll. Dr. J. M. Dalziel. No. 172.

2246 **Vitex yunnanensis,** W. W. Sm. Sp. nov.

Species ex affinitate *V. vestitae,* Wall. a qua foliolis parvis brevissime petiolulatis, floribus multo majoribus inter alia facile dignoscitur.

Frutex 1–5 m. altus ramulis primo tomentellis flavo-glandulosis tandem glabrescentibus cinereis. Folia 3-foliolata, rarius 5-foliolata, petiolo 1.5–3 cm. longo fulvo-tomentello suffulta; foliola inaequalia, terminale saepius majus petiolulo 2 mm. longo praeditum, lateralia brevissime petiolulata, inferiora dum adsint minima, majora 3–4 cm. longa, ± 2 cm. lata, ovata apice obtusiuscula basi late cuneata vel rotundata, papyracea margine integra ciliolata supra atroviridia ad nervos sparse pilosula, glandulis flavis nitentibus conspersa, infra fulva, ad costam nervosque dense albo-pilosa caetera subepilosa glandulosa. Inflorescentiae axillares e cymulis 3–7-floris compositae; pedunculi ad 1 cm. longi, pedicelli 2–3 mm. longi, bracteae lineares vix 1 mm. longae, omnes albo-pilosi atque dense glandulosi. Calyx circ. 3 mm. longus campanulatus albo-pilosus glandulosus dentibus 5 vix 0.5 mm. longis late triangularibus obtusiusculis. Corolla ad 1.7 cm. longa alba vel roseo-suffusa; tubus fere 1 cm. longus leviter incurvus supra paululo dilatatus extus puberulus intus ad insertionem staminum dense albo-pilosus; lobi inaequales rotundati, extus glandulosi intus glabri, anticus circ. 7 mm. longus. Filamenta basi albo-pilosa supra glabra. Ovarium 2–4 loculare. Drupa globosa calyce fere ad 1 cm. diametro aucto suffulta, ipsa ± 1 cm. diametro, endocarpio osseo praedita.

"Shrub of 6–9 ft. Flowers white or flushed rose. Open dry situations in the Fengkow Valley, Yunnan. Lat. 27° 40′ N. Alt. 8000 ft. June 1914." G. Forrest. No. 12,471.

"Shrub of 3–6 ft. Flowers white, tinged blue. Open scrub on the descent to the Yangtze from the eastern boundary of the Lichiang Valley, Yunnan. Lat. 27° 15′ N. Alt. 9000–10,000 ft. June 1913." G. Forrest. No. 10,100.

The following are, I believe, the same:—

"Shrub of 10–15 ft. Flowers pale soft rose. Amongst

scrub on the mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 10,000 ft. Aug. 1913." G. Forrest. No. 10,719. The leaves are larger and less hairy.

"Shrub of 15 ft. In fruit. In open thickets on the Tong Shan in the Yangtze bend. Lat. 27° 20′ N. Alt. 9000 ft. Aug. 1913." G. Forrest. No. 10,891.

"Duplicate of No. 10,891 taken later in fruit. Sept. 1913." G. Forrest. No. 11,349.

This species is readily distinguishable from its Indo-Chinese allies by the large flowers.

Wendlandia subalpina, W. W. Sm. Sp. nov.

Species nana prostrata ex affinitate *W. Henryi*, Oliv.; habitu, foliis minimis, cymulis terminalibus subglobosis distinctissima.

Fruticulus prostratus 30–60 cm. longus habitu *Cotoneastri microphyllae*, Wall. ramosissimus ramis crassis rigidis cortice griseo praeditis ramulis tortuosis brevibus floriferis pilosulis. Folia petiolo 1–2 mm. longo minute pilosulo suffulta; lamina ± 6 mm. longa ± 5 mm. lata late ovata vel suborbicularis apice rotundata basi late cuneata integra coriacea supra atro-viridis subnitens sparse pilosula nervis obscuris infra pallidior sparsius pilosula nervis 2–3 paribus inconspicuis; stipulae triangulares circ. 1 mm. longae persistentes. Cymulae globosae ramulos terminantes compactae 6–12-florae minute pilosulae folia superiora paululo superantes; pedunculus brevissimus; pedicelli 2–3 mm. longi; bracteae bracteolaeque 1–2 mm. longae lineares pilosulae. Calycis tubus turbinatus circ. 1.5 mm. longus sparse pilosulus; lobi fere 1.5 mm. longi lineares vel lineari-lanceolati acuti vel obtusiusculi. Corollae albae tubus elongato-infundibularis vel subcylindricus vix 4 mm. longus apice ± 1 mm. latus extus glaber vel minute puberulus fauce glaber; lobi 5 contorti patentes tandem reflexi circ. 4 mm. longi 1 mm. lati, loriformes obtusiusculi glabri. Stamina 5, inter lobos corollae inserta, exserta, filamentis 2.5 mm. longis glabris, antheris circ. 1.5 mm. longis dorso affixis. Ovarium biloculare; stylus filiformis multo exsertus circ. 7 mm. longus glaber stigmate bifido lobulis 1 mm. longis. Fructus parvus subglobosus circ. 2 mm. diametro calycis lobis persistentibus coronatus crustaceus sparse pilosulus fere per totam longitudinem in duas partes dehiscens; partes ambae post seminum lapsum persistentes. Semina numerosa circ. 0.5 mm. longa minute areolatà nitentia pallide brunnea.

"Dwarf prostrate shrub of 1–1½ ft. Flowers white. Open stony pasture and on cliffs in the mountains in the N.E. of the Yangtze bend, Yunnan. Lat. 27° 45′ N. Alt. 11,000–12,000 ft. July 1913." G. Forrest. No. 10,378.

"Shrub of 1–2 ft. In fruit. Open dry situations in the Yang-pi mountains, Yunnan. Lat 26° 45′ N. Alt. 9000 ft. Sept. 1913." G. Forrest. No. 10,999.

An alpine or subalpine plant, in flower and fruit certainly very closely allied to *W. Henryi*, Oliv., but differing in habit very markedly from any *Wendlandia* known to me.

Ypsilandra yunnanensis, W. W. Sm. et J. F. Jeff. Sp. nov.

Species habitu simillima *Y. thibeticae*, Franch. speciei adhuc unicae; pedicellis, filamentis brevissimis, stylo brevissimo, stigmate trifido nec capitato valde recedit.

Planta 15–30 cm. alta, fructu ad 45–60 cm. aucta. Rhizoma sat crassum radicibus fibrosis bene obsitum. Folia basilaria 6–12, rosulam formantia 6–15 cm. longa, 1.5–2 cm. lata, oblanceolata vel lineari-oblanceolata apice obtusa vel subrotundata indurato-apiculata basi in petiolum vix discretum ± longiuscule attenuata textura in sicco firma glaberrima nervis ± 15 vix conspicuis mediano haud majore pererrata; rosula squamis paucis membranaceis vel subfoliaceis basi cincta. Scapus erectus robustus vel nonnunquam gracilis glaber foliis caulinis vaginiformibus 5–6 remotis 1.5–2.5 cm. longis membranaceis scapo appressis praeditus. Inflorescentia racemosa 6–9-flora circ. 3 cm. longa, fructu multo elongata, ebracteata; pedicelli circ. 2 mm. longi, fructu ad 4 mm. elongati glabri. Flores contigui nutantes mediocres albi malodori. Perianthii campanulati persistentis segmenta libera ± 6 mm. longa circ. 2.5 mm. lata elliptica apice obtusa vel rotundata trinervula. Stamina 6 ad basim segmentorum affixa perianthium medium haud superantia, filamentis glabris basi paulo complanatis antheris hippocrepiformibus unilocularibus. Ovarium staminibus paulo brevius trilobum triloculare ovulis numerosissimis; stylus brevissimus stigmate trifido lobulis recurvis stylum ± aequantibus. Capsula alte triloba septicide dehiscens ei *Heloniopsidis* subsimilis; semina fusiformi-subulata.

"N.W. Yunnan, Salween-Mekong divide, east slope. Wet places in open forest. Alt. 13,000 ft. June 1911." Kingdon Ward. No. 163.

"Plant of 18–24 inches. In fruit. Open pasture on the western flank of the Shweli-Salween divide, Yunnan. Lat. 25° 20′ N. Alt. 10,000–11,000 ft. Aug. 1912." G. Forrest. No. 8956.

"Plant of 6–9 inches, malodorous. Flowers white. Shady situations in thickets on Shweli-Salween divide, Yunnan. Lat. 25° 10′ N. Alt. 9000 ft. Aug. 1913." G. Forrest. No. 12,055.

Burma:—"Ridge of Naung-Chaung-Nwai divide, Burmo-Chinese frontier. On mossy grass-clad ridge under dwarf

bamboo brake, in damp shady situation. Flowers green. Alt. 11,000–12,000 ft. July 1914." Kingdon Ward. No. 1808.

This new species of *Ypsilandra* does not fit exactly into that genus as described by Franchet. The genus has hitherto been monotypic, and the generic characters were based entirely upon the single species. There is an excellent figure with dissections in Nouv. Arch. Mus. Hist. Nat. Paris, x, pl. 17. The habit of this plant, the leaves, the scales on the scape, the perianth, the anthers, the ovary, and the seeds are quite in accord with the new species, which differs markedly in the very short stamens and style and in the trifid not capitate stigma.

Vol. IX. [FOR OFFICIAL USE.] Number XLIII.

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FROM THE

ROYAL BOTANIC GARDEN, EDINBURGH.

MARCH 1916.

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EDINBURGH:
PRINTED UNDER THE AUTHORITY OF HIS MAJESTY'S STATIONERY OFFICE
By NEILL & CO., LIMITED,
At 212 Causewayside.

SOLD AT THE GARDEN,
And to be purchased, either directly or through any Bookseller, from
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New Species of Primula.

BY

PROFESSOR BAYLEY BALFOUR, F.R.S.

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[Notes, R.B.G., Edin., No. XLIII, March 1916.]
Wt. 4138/89—375—1/17—N. & Co., Ltd. Gp. 10.

Primula aerinantha, Balf. fil. et Purdom. (Muscarioides.)

Perennis rhizomate parvulo foliis rosulatis petiolatis. Folia ad 8 cm. longa; lamina tenuis membranacea oblonga vel elliptica ad 5 cm. longa ad 3 cm. lata apice rotundata nunc subobtusa margine leviter serrato-denticulata dentibus hydathodo apiculato terminatis breviter ciliata utrinque sparsim puberula subtus pallidior pilis longioribus paucis costam mediam basim versus obtegentibus deorsum in petiolum ad 4 mm. longum vix viride alatum haud vaginantem gradatim attenuata. Scapus pro planta altus ad 30 cm. tenuis infra glaber supra inflorescentiam versus albo-farinosus spicam terminalem capitatam brevem plurifloram gerens; bracteae deflexae inferiores fertiles virides ligulatae acutae circa 5 mm. longae haud vaginatae plus minusve albo-farinosae superiores floribus inhibitis axillantes latiores purpurascentes spicam coronantes; pedicelli nulli; anthopodium nullum. Flores dense aggregati. Calyx ad 4 mm. longus plus minusve albo-farinosus poculiformis latus tubo membranaceo lobis tubum aequantibus inaequalibus posteriore maximo lanceolatis subacutis venulosis. Corollae omnino purpureae oculo pallidiore efarinosae tubus angustissimus in flore brevistylo circ. 1.2 cm. longus erugosus exannulatus cylindricus supra stamina inflatus ad faucem constrictus, limbi concavi discus 1 mm. latus, lobi erecti obovati profunde emarginati segmentis integris divaricatis sinuque mucronato. Stamina filamentis brevissimis antheris angustis circ. 1.5 mm. longis connectivo purpurascente in flore brevistylo supra medium tubi corollini inserta antherarum apicibus ab ore circ. 1.5 mm. remotis in longistylo infra medium inserta antheris ultra calycem exsertis. Ovarium globosum; styli delicatissimi brevis tubo corollae dimidio brevior, longus quadrante brevior; stigma parvulum capitatum. Capsula muro crustaceo late globosa parte superiore ultra calycis segmenta prolata inferiore calycis tubo inclusa ab apice ad basim valvis concavis latis 5 dehiscens; placenta succulenta lata discoidea viridis infra centraliter affixa ex toto seminifera. Semina minutissima oblonga circ. 1 mm. longa vix 0.3 mm. lata complanata margine cellulis testae aeriferis alata.

Species Sectionis Muscarioidis bene distincta *P. cernuae,* Franch. proxima sed foliis longe petiolatis margine denticulato-serratis, corollae tubo angusto longiore petalisque obovatis fere bifidis diversa.

West Kansu. Lien-wha-shan. Alt. 9000–12,000 ft. Purdom. No. 738. 1911. In Herb. Kew.

" Kansu. Only known so far in one big gully on Lotus Mountain, where it occurs sparingly on mossy banks and ledges of a

limestone cañon with pines above it on either side. An interesting glabrous *Giraldiana* with small and very fragrant flowers of soft clear blue." July 1914. Farrer and Purdom. No. 273. P. 23. In Herb. Edin.

A distinct plant of the Muscarioid Section found first of all by Purdom in 1911 when collecting for Veitch. I do not know that Veitch raised plants from it. Its nearest ally is the imperfectly described *P. cernua,* Franch. from which it is readily told by its foliage and the flowers with delicate corolla tube and cut petals. Purdom's flowering specimens now in the Kew Herbarium are the basis of the description. The specimens collected by Farrer and Purdom in 1914 are in fruit and enable me to complete the description. The plant flowered at Edinburgh in 1916. It is a distinct and pleasing member of its section.

1402 **Primula anisodora,** Balf. fil. et Forrest. (Candelabra.)

Aromatica odore anisi glaberrima efarinosa. Folia ad 2 dm. longa ad 7 cm. lata elongato-obovata apice obtusa vel rotundata membranacea venis haud prominulis argute irregulariter denticulata plus minusve glanduloso-foveolata in petiolum alatum vaginantem lamina breviorem attenuata. Scapus ad 6 dm. altus validus umbellam terminalem et verticillos 3–5 ad 8-floros gerens ; bracteae ad 7 mm. longae lineari-acuminatae hydathodo terminatae ; pedicelli bracteis duplo longiores a basi subnutantes post anthesin erecti aucti. Calyx ad 5 mm. longus cupuliformis ad trientem fissus lobis triangulari-ovatis nervo prominulo margine membranaceis minute fimbriato-erosis fimbriis hydathodo terminatis. Corollae infundibuliformis nigro-purpureae subcrassiusculae tubus ad 9 mm. longus aureo-annulatus annulo inaequaliter 10-lobato lobis antipetalis 5 majoribus interpetalis 5 minoribus intus supra stamina glanduloso-puberulus infra membranaceus, limbi concavi discus vix 1 mm. latus, lobi breves subquadrati subtruncati imbricati erecti ad 3.5 mm. longi ad 5 mm. lati crassi leviter emarginati crenulati. Stamina floris brevistyli supra medium tubi corollini inserta antherarum apicibus ab annulo 1 mm. remotis longistyli fere ad basim corollae antherarum apicibus 4 mm. ab annulo. Ovarium globosum ; stylus brevis vix calycem aequans, longus corollae tubo dimidio brevior ; stigma subglobosum. Capsula subglobosa calycem vix auctum paullo superans stylopodio nigro-rubro crenulato coronata valvis 5 dehiscens.

Species efarinosa aromatica floribus intense purpureis ; a *P. glycosmate,* Petitm. foliis brevioribus, bracteis longioribus, corolla nigro-purpurea, lobis petalinis brevibus subquadrangularibus distincta.

"Yunnan. Mountains of the Chungtien plateau. Open moist alpine pasture. Lat. 27° 55′ N. Alt. 11,000 ft. Plant of 20–30 inches. All parts when fresh strongly aromatic with an odour resembling aniseed. Flowers deep plum-purple, almost black, drying a lighter shade." G. Forrest. No. 10,617. July 1913.

"Yunnan. Chungtien plateau. Alt. 10,000 ft. Lat. 27° 30′ N. Plant of 2–3 ft. Flowers deep black-purple, drying lighter. Strongly fragrant with an odour like aniseed. Open moist meadows." G. Forrest. No. 12,730. July 1914.

This species has the darkest coloured flowers of all Candelabra Primulas—perhaps of all wild Primulas. It belongs to the series of the efarinose purple-flowered Candelabras in which the redolent gland secretion is profuse. Of that series we now know seven species :—*P. Poissonii*, Franch., *P. Wilsoni*, Dunn, *P. glycosma*, Petitm., *P. Miyabeana*, Ito et Kawakami, *P. oblanceolata*, Balf. fil., *P. ianthina*, Balf. fil et Cave, and *P. anisodora*, Balf. fil. et Forrest. The odour is least marked in *P. Poissonii*, where it is sometimes hardly perceptible ; and in *P. oblanceolata* it is, though evident, not very conspicuous. But in all the others the perfume is strong even in dried material.

P. anisodora is not far removed from *P. glycosma*. The two species are marked out amongst the efarinose purple-flowered Candelabras by the dark, nearly black, purple colour of their corollas — paler in *P. glycosma* than in *P. anisodora*—and they are about the most aromatic of the series. In dried specimens the difference between the species is not difficult to make out :—the broader shorter leaves of *P. anisodora* and their more glaucous under surface ; the long petiole in *P. glycosma* ; the very short bracts of *P. anisodora*, and its more delicate longer pedicels ; the slightly larger calyx with somewhat fimbriate not sharply apiculate lobes of *P. anisodora* ; and, most striking, the corolla, which in *P. anisodora* is funnel-shaped with a concave limb ending in somewhat quadrate truncate lobes, whilst in *P. glycosma* there is the funnel-shaped tube, but the concave limb expands into a series of rounded broad segments.

From seed obtained by Mr. Forrest plants of *P. anisodora* have been raised and flowered at Edinburgh. The flower colour recalls that of some of the brown auriculas with yellow eye. Mr. Forrest tells me seeds of *P. glycosma*, are in his collection also, and we may hope, therefore, for a crop of living plants which will enable us to appraise more accurately the relationships of the two forms. They ought to

be interesting garden plants on account of their flower colour, and I expect that they will prove to be as hardy and resistant as that hardiest of all Candelabras, *P. Poissonii*. They will certainly do much by hybridisation for colour tint in Primula.

Primula aureostellata, Balf. fil. et Cooper. (Amethystina.)

Rhizoma parvum radicibus erubescentibus foliis floribusque coaetaneis. Folia crasse coriacea redolentia ad 7 cm. longa ad 1.5 cm. lata vix distincte petiolata lanceolata vel oblanceolata vel oblonga acuta margine rigide cartilaginea denticulis firmis paucis triangularibus subaculeatim praedita deorsum gradatim in basim ligulatam membranaceo-alatam integram attenuata utrinque epilosa glanduloso-foveolata supra pallide viridia subtus pallidiora nunc subglauca. Scapus elatus ad 3–5 cm. altus glaber umbellam subsecundam parvam ad 6-floram gerens ; bracteae sublineares subulatae subfoveolatae ad 6 mm. longae basi extus pulvinatim incrassatae pedicellos adhaerentes ; pedicelli breves ad 6 mm. longi subglandulosi ; anthopodium parvum. Calyx coriaceus viridis tubulosus circ. 8 mm. longus 5-costatus extus glanduloso-foveolatus lobis circ. 3 mm. longis sublanceolatis obtusis margine membranaceis. Corollae coriaceae tubus in flore longistylo calycem subaequans circ. 8 mm. longus cylindricus supra stamina paulo ampliatus flavidus intus puberulus exannulatus, limbus subplanus aureus albido-marginatus disco circ. 2 mm. lato extus intusque glanduloso-puberulo lobis ad 9 mm. longis anguste obovatis basi contractis emarginatis. Stamina basim tubi corollini versus inserta filamentis conspicuis strumis corollinis pseudo-annulatim conjunctis antheris angustis ad 2 mm. longis. Ovarium ovoideum ; stylus longus fragilis corollae tubum subaequans ; stigma parvum globosum. Capsula circ. 9 mm. longa 4 mm. lata calyce omnino inclusa ab apice valvis 5 brevibus incrassatis dehiscens ; placenta cylindrica breviter crasseque stipitata circ. 5.5 mm. longa. Semina grisea elongata circ. 1.5 mm. longa .75 mm. lata complanata (ac tamen angulata) laevia nec prominenter vesiculoso-tuberculata.

Species ex affinitate Sectionis Amethystinae foliis glanduloso-foveolatis floribus subsecundis corollae limbo aureo-stellato notata.

"Bhutan. Kempé La, Pumthang. Alt. 11,000 ft. In marsh. Flower open, white, yellow star-blotch on centre, glistening hairs in mouth." R. E. Cooper. No. 4173. 23rd July 1915.

This species has the appearance of *P. Faberi*, Oliv., a yellow-flowered member of the Amethystina Section, but is readily

distinguished by its foveolate leaves and smaller flowers. It has the smooth soap-like seed of *P. Kingii*, Watt—a characteristic purple-red-flowered Indian member of the Section. We do not know enough yet about the species in this Section to sanction critical treatment, and in placing *P. aureostellata* in the Section at the moment I do so with reserve.

1464 **Primula brevicula,** Balf. fil. et Forrest. (Pulchella.)

Caespitosa albo-farinosa rhizomate multicipite vestigiis siccis plurimis foliorum praeteritorum dense obtecto foliis petiolatis late vaginantibus. Folia ad 10 cm. longa subspathulata; lamina ad 1.5 cm. lata elliptica vel oblongo-elliptica vel oblonga vel oblanceolata apice obtusa vel subacuta margine regulariter serrata subrecurva basi in petiolum lamina plerumque longiorem late vaginantem attenuata supra pilis fariniferis sparsissime praedita subtus dense albo-farinosa. Scapus ad 12 cm. longus validus praesertim infra flores plus minusve albo-farinosus umbellam ad 6-floram gerens; bracteae lineari-subulatae ad 1 cm. longae basi latiores et subtus quasi leviter pulvinatim incrassatae purpurascentes plus minusve albo-farinosae; pedicelli bracteas subaequantes vel eis breviores sub fructu accrescentes erecti albo-farinosi in anthopodium gradatim incrassati. Flos fragrans. Calyx ad 8.5 mm. longus breviter campanulatus extus atropurpureus et plus minusve albo-farinosus fere ad basim fissus lobis angustis ligulatis acutis intus dense albo-farinosis. Corollae azureae floris brevistyli tubus membranaceus circ. 1 cm. longus cylindricus supra stamina ampliatus intus obscure rugosus annulatus annulo tenui, limbi discus angustus vix 0.5 mm. latus, lobi ad 9 mm. longi obovati tridentati. Stamina floris brevistyli filamentis conspicuis tenuibus deorsum expansis et inter se basi conjunctis antheris circ. 2.5 mm. longis apiculatis supra medium tubi corollini inserta antherarum apicibus circ. 1.5 mm. ab annulo remotis et calyce vix longioribus. Ovarium globosum; stylus brevis calyce dimidio brevior; stigma magnum discoideum recurvum lobulatum. Capsula circ. 1.2 cm. longa cylindrica calycem paullo superans straminea crustacea apice valvis 5 primariis recurvis saepe fissis dehiscens; placenta brevis circ. 3 mm. longa claviformis vix stipitata.

Species *P. minori*, Balf. fil. et Ward affinis sed albo-farinosa.

"Yunnan. Western flank of the Lichiang Range. Alt. 13,000 ft. Lat. 27° 25′ N. Plant of 3–5 inches. Ledges of limestone cliffs. Very rare." G. Forrest. No. 6425. August 1910.

"Yunnan. Mountains in the N.E. of the Yangtze bend. Alt. 12,000–13,000 ft. Lat. 27° 40′ N. Plant of 3–5 inches.

Flowers blue, eye purplish-yellow, fragrant. Moist limy pasture and the ledges of limestone cliffs." G. Forrest. No. 10,405. July 1913.

Mr. Forrest obtained this plant in course of his second exploration of Yunnan, but only in fruit, Specimens in his 1913 and 1914 collections with flower enable a determination of the species to be made. It is one of the Pulchella series, but is distinguished alike from *P. pulchella*, Franch. and *P. minor*, Balf. fil. et Ward by the copious white mealy covering. It has flowered at Edinburgh and seems to be thoroughly hardy. Its glossy foliage marks it at sight as distinct from *P. minor*.

(55) **Primula cana,** Balf. fil. et Cave. (Rotundifolia.)

Planta cana rhizomate longo breviter ramoso profuse radicante foliorum scaporumque vestigiis siccis intertextis involutis densissime obtecto. Gemmae squamis elongatis crustaceis margine membranaceis imbricatis dense sulphureo-farinosis circumdatae. Folia longe petiolata ad 9 cm. longa; lamina oblonga vel elliptico-oblonga vel subrotundata ad 5 cm. longa ad 3.5 cm. lata crasse coriacea subaequaliter dentata dentibus obtusis vel acutis hydathodo terminatis nonnunquam denticulatis basim versus in petiolum erubescentem anguste alatum longe vaginantem cuneatim attenuata nec cordata supra viridis puberula subtus dense sulphureo-farinosa. Scapus circ. 10 cm. longus plus minusve farinosus umbellam ad 16-floram gerens; bracteae lineari-subulatae circ. 1.2 cm. longae dense sulphureo-farinosae basi extus leviter pulvinatim incrassatae; pedicelli sub anthesi circ. 2 cm. longi filiformes sulphureo-farinosi plus minusve divaricatim nutantes sub fructu stricti et inaequaliter elongati fere ad 5.5 cm. spadiceo-brunnei glabri; anthopodium conspicuum anguste obconoideum. Calyx circ. 1 cm. longus extus intusque dense sulphureo-farinosus late infundibuliformis ultra medium fissus, lobis a basi angusta lanceolato-acuminatis circ. 7 mm. longis subpatentibus. Corollae in flore longistylo tubus angustus cylindricus circ. 1 cm. longus infra staminum insertionem constrictus supra vix ampliatus membranaceus extus plus minusve farinosus intus erugulosus laevis ad faucem annulo flavo 5-lobato parvo cinctus, limbi plani discus angustus circ. 1 mm. latus, lobi angusti obovati circ. 8 mm. longi vix 5 mm. lati leviter crenulati. Stamina infra medium tubi corollini inserta calyce breviora filamentis distinctis 0.5 mm. longis antheris circ. 2 mm. longis apiculatis. Ovarium ellipsoideum stylopodio coronatum; stylus longus filiformis fere exsertus; stigma capitatum. Capsula spadicea calyce omnino inclusa oblonga circ. 8 mm. longa vix 3 mm. diam. valvis 5 saepe fissis crustaceis brevibus reflexis ab apice dehiscens;

placenta circ. 4 mm. longa cylindrica stipite conspicuo circ. 1 mm. longo. Semina angulata ellipsoidea nunc complanata circ. 0.75 mm. diam. pallide fulva testae vesiculis magnis notata.

Species ex affinitate *P. rotundifoliae,* Wall. foliis basi cuneatis, calyce tubum corollinum angustum aequante bene distincta.

Sikkim. Cave. Nos. 1423, 1513.

There are no particulars of the precise locality in Sikkim whence Mr. Cave derived the specimens of this plant. It is easily recognised amongst all forms belonging to the immediate circle of *P. rotundifolia,* Wall. by the cuneately-based leaves, the copiously branched inflorescence and the large calyx. The whole plant is hoary with abundant meal.

Primula cardiophylla, Balf. fil. et W. W. Sm. (Rotundifolia.)

P. rotundifolia, Hook. fil. in Fl. Brit. Ind. iii (1882), 483, pro pte.; Pax Monogr. Primul. in Engl. Pflanzenr. (1905), 120, p.p.

Planta robusta rhizomate crasso profuse radicante radicibus rubicundis foliorum scaporumque vestigiis siccis dense obtecto in siccitate petiolis ligulatis inter se contortis et circum scapos strictos plus minusve volutis. Gemmae squamulis utrinque sulphureo-farinosis ovato-acuminatis persistentibus imbricatim vestitae. Folia plurima redolentia longe petiolata sub anthesi circ. 14 cm. longa postea aucta; lamina carnosula cucullata cordato-reniformis vel cordato-orbicularis circ. 4–6 cm. diam. sub fructu aucta lobis basalibus rotundatis conniventibus sinum angustum claudentibus margine dentata dentibus inaequalibus triangularibus obtusis hydathodo apiculatis supra laete viridis glandulis minutis capitatis subviscidis obtecta subtus dense sulphureo-farinosa; petiolus crassus ad 10 cm. longus in juventute plus minusve sulphureo-farinosus deinde glanduloso-puberulus canaliculatus exalatus basim versus dilatatus ibique subalatus et plus minusve erubescens. Scapus validus sub anthesi ad 22 cm. altus sub fructu multo longior plus minusve sulphureo-farinosus umbellam ad 16-floram globosam solitariam gerens nunc verticillis 1–2 accessoriis inferioribus multifloris inter se remotis praeditus; bracteae dense farinosae lineares subulatae ad 1.5 cm. longae pedicellis sub anthesi longiores vel eos aequantes nunc breviores; pedicelli ad 2 cm. longi plus minusve filiformes dense farinosi; anthopodium crassum turbinatum circ. 2.5 mm. longum. Calyx circ. 6 mm. longus crassus extus intusque farinosus fere ad basim fissus tubo poculiformi lobis trinerviis oblongis obtusis rarius denticulatis. Corollae tubus in flore brevistylo 1.4 cm. longus infra cylindricus supra calycem erubescens ibique extus glaber supra stamina paulo ampliatus ibique extus pallide viridis et farinosus intus

erugulosus ad os pentagonum annulatus annulo 5-lobato, limbi plani vel subrepandi malvaceo-purpurei utrinque plus minusve farinosi discus circ. 1 mm. latus, lobi late obovati vel orbiculares circ. 8 mm. diam. apice subretusi vel subcrenulati. Stamina ad faucem tubi corollini inserta antherarum apicibus circ. 1 mm. ab annulo remotis filamentis conspicuis virides-centibus brevibus antheris latis circ. 1.5 mm. longis connectivo viridi-colorato apiculato. Ovarium breviter cylindricum; stylus brevis calycem aequans vel paulo longior; stigma spongiosum magnum subcylindricum vel turbinatum albidum. Capsula ad 9 mm. longa crasse crustacea calyce dimidio longior spadiceo-fusca valvis 5 reflexis ab apice dehiscens; placenta cylindrica circ. 4 mm. longa breviter stipitata. Semina nigra oblonga angulata circ. 0.75 mm. longa; testa grosse vesiculosa.

Species olim cum *P. rotundifolia*, Wall. confusa sed robustior et foliis majoribus, bracteis multo longioribus, calycis lobis latioribus, corollae lobis rotundatis notisque aliis diversa.

Sikkim. Interior. J. D. Hooker. May 1848. In Herb. Kew.

Sikkim. Sandakphu and Singaleelah Range. Alt. 12,000–13,000 ft. Watt. No. 5375. 1881. In Herb. Kew, Calc., Edin.

Sikkim. Sandakphu. Alt. 11,700 ft. Lace. No. 2255. 23rd May 1902. In Herb. Calc.

Sikkim. Sandakphu. Alt. 11,000 ft. Rhomoo. No. 2196. 3rd Jan. 1909. In Herb. Edin.

Sikkim. Sandakphu. Alt. 12,000 ft. Cave. 15th Jan. 1912, 30th May 1913. In Herb. Edin.

Specimens showing enlarged fruiting state :—

Sikkim. Kurz. Oct. 1868. In Herb. Calc.

Sikkim. Sandakphu. 12,000 ft. Gamble. No. 65c. Oct. 1875. In Herb. Calc.

Sikkim. Sandakphu. 12,000 ft. King's Collector. 1888. In Herb. Calc.

Sikkim. Sandakphu. 11,000 ft. No. 11,593. Oct. 1898. In Herb. Calc.

Sikkim. Sandakphu. 11,000 ft. Cave. No. 6323. 2nd Aug. 1915. In Herb. Calc.

Most Indian botanists have identified with *P. rotundifolia*, Wall. from Gossain Than in Nepal some plants from about Sandakphu and Singaleelah in S.W. Sikkim. But these Sikkim plants are not, or at any rate not all, Wallich's species. Sir Joseph Hooker has indicated his doubt of the identity of the Sikkim and Nepalese plants on a sheet in the Kew Herbarium of specimens collected by himself in 1848, and marked "interior of Sikkim." Whether or no that means the south-western corner whence all other herbarium material is derived I cannot say, but certainly this plant is the same as many of the Sandakphu ones.

I find that Mr. Craib has also queried in Kew Herbarium the identification of the Sikkim and the Nepal plants.

I have had opportunity of examining four sheets of Wallich's species—one in the Kew Herbarium and three in the Calcutta Herbarium—and I come to the same conclusion as Sir Joseph Hooker and Mr. Craib. I am indeed not convinced that all the Sandakphu and Singaleelah plants are of one species, and the suggestion of this difference amongst them, and that there may be two species, or at least microforms, is based not only upon examination of herbarium material but also upon recollection of cultivated plants. We used to grow at Edinburgh a plant under the name of *P. rotundifolia* (raised from Calcutta seed) of which I have the following note :—leaves small, sulphur-mealy below, with delicate petioles, a scape bearing a single umbel of pink flowers with short bracts and longer pedicels, the corolla tube was funnel-shaped, with the tips of the anthers in the short-styled flowers close up to the annulus though not exserted, and the style itself nearly twice as long as the calyx. I do not recollect a great increase of leaf development after flowering and as the fruits matured. Our plant of to-day under the name of *P. rotundifolia*—it came to us from Mr. Cave at Darjeeling—is a much more robust one, with leaves having stout petioles and enlarging to twice the flowering size during fruiting ; the single flower umbel is often subtended by a whorl of flowers, the flowers themselves are subtended by bracts longer than or as long as the pedicels, and have a narrow cylindric tube to their corolla, and the tips of the stamens in the short-styled plant are a little below the mouth of the throat, the short style being hardly longer than the calyx. As cultivated plants the two are very different. I have not dried specimens of the two plants to stimulate recollection. They were too precious to sacrifice for the herbarium, and now we seem to have lost the old plant. Of it I have only a couple of flowers preserved in spirit for comparison. Therefore my saying about it is somewhat indefinite and would not have beenintroduced here but that I think the dried specimens in herbaria seem to support and are not hostile to the view that there are two distinct plants, and I would like to ask collectors to observe carefully the plants in their native habitat. Here I am contenting myself (along with Mr. Smith) with demarking under the name *P. cardiophylla*, Balf. fil. et W. W. Sm. from Wallich's *P. rotundifolia* the plant of which Sir Joseph Hooker had doubts and with which may be associated specimens of other collectors as cited above. This is the plant we have now growing at Edinburgh, and no longer to be called *P. rotundifolia*, Wall.

Of specimens hitherto called *P. rotundifolia*, Wall. which are

not that species and which are perhaps not *P. cardiophylla*, Balf. fil. et W. W. Sm. I cite here :—

Sikkim. 11,000 ft. Tanner. In Herb. Calc.

Sandakphu. 12,000 ft. Clarke. No. 13,707 C. (in Herb. Calc.) ; 13,707 J. (in Herb. Kew). 5th June 1884.

Sandakphu. King's Collector. June 1887. 12,000 ft. June 1888. In Herb. Calc.

Sandakphu. 11,800 ft. Gammie. No. 14. 10th June 1891. In Herb. Calc.

Sandakphu. Rhomoo. No. 285. 30th May 1908. In Herb. Edin.

Sandakphu. Rhomoo. No. 782. 21st July 1910. In Herb. Edin.

I may point out that the increase in size of leaf by the time fruit is mature is remarkable, the petiole and lamina sharing equally in the increase. And this leads me to speak of a specimen in the Kew Herbarium which bears the label "*Primula rotundifolia*, Wall. var.—Laka, 11,000 ft. Dhurmsala, Clarke, No. 24,559. 17th Oct. 1874." In pencil on the sheet is written "*P. tricostata*, Watt." There are specimens of two distinct species on the sheet. One specimen is a scrap of a fruiting scape, and it might belong to *P. cardiophylla*. The rest of the specimens, also fragmentary—four leaves, a rhizome, and portions of two scapes bearing fruit—supposing them to be of one species —belong to a plant of quite a different Section. The calyx is that of one of the Geranioides, and its ribbing has given origin apparently to the MS. name. The leaves and the rhizome bud would suit Geranioides, but there is no Indian species of the Section with similar leaves and fruit. The leaves recall those of *P. mollis*, Hook., but the scapes do not. It is a plant to be looked for. Why it calls for mention here is that in "Flora of British India" the area of distribution of *P. rotundifolia*, Wall. is given as "Temperate Himalaya ; from Kashmir, alt. 11,000 ft. to Sikkim, alt. 12,000–13,000 ft." The statement is, I suspect, based upon this Kew sheet. But neither *P. rotundifolia*, Wall., nor any one of its immediate allies, is found in the West Himalaya. *P. rotundifolia*, Wall. is to our present knowledge a plant of Nepal. *P. cardiophylla*, here segregated, is a plant of S.W. Sikkim, and this is the species to which most of the *P. rotundifolia* of living collections belongs.

148 **Primula chrysochlora,** Balf. fil. et Ward. (Candelabra.)

Glabra efarinosa. Folia membranacea rosulata tenuia viridia ad 8 cm. longa ad 3 cm. lata oblonga vel oblongo-obovata obtusa margine irregulariter denticulata basi in petiolum brevissimum vaginantem attenuata subtus pallidiora glanduloso-

foveolata. Scapus robustus ad 4 dm. altus nigro-viridis umbellam terminalem plurifloram (ad 12) et verticillos inferos 3–4 inter se remotos gerens; bracteae ad 2.5 cm. longae laete virides elongato-lanceolatae acuminatae vel ligulatae apice nonnunquam dentatae; pedicelli validi mox deflexi bracteis breviores. Calyx tubuloso-campanulatus ad 7.5 mm. longus 5-costatus costis laete viridibus intervallis pallidis pergamentaceis ad medium fissus lobis triangulari-acuminatis hydathodo corneo terminatis. Corollae aureae tubus ad 1.2 cm. longus floris longistyli infundibularis, brevistyli cylindricus angustior, annulatus intus infra stamina membranaceus transverse rugosus supra crassior granuloso-puberulus, limbus granuloso-puberulus, lobi late obcordati vel subrotundati ad 8 mm. diam. emarginati. Stamina floris brevistyli antheris sub annulum insertis, longistyli basim tubi corollini versus inserta calyce inclusa et strumis corollinis annulatim separata. Ovarium ovoideum; stylus brevis calyce brevior, longus exsertus; stigma globosum.

Ex affinitate *P. helodoxae,* Balf. fil. sed farinae inopia, foliis membranaceis, pedicellis nutantibus, calyce ad medium fisso differt.

"Yunnan. Marshes near Tengyueh. Alt. 4000–5000 ft. 12th April 1913. Just coming into flower." F. K. Ward. No. 211.

This species of Candelabra Primula sent by Kingdon Ward, coming from the same general area as *P. helodoxa,* Balf. fil., which in appearance it recalls, has more than ordinary interest on account of the variability that is shown by the latter species. *P. chrysochlora,* Balf. fil. et Ward is a plant of very wet places, and its leaves are thin and membranous, short and broad—more so than in any form of *P. helodoxa,* Balf. fil.,—and they make a spreading rosette. There is no trace of the golden meal so prominent on the inflorescence of *P. helodoxa,* Balf. fil. The bracts and calyx are green, wonderfully bright in a dried specimen. The bracts are long, exceeding the pedicels, and have a general strap form tapering mostly to the point, but sometimes not diminishing in width, and then having a toothed apex. The absence of the meal from the calyx allows the sepaline ridges to show up as green bands in the middle of each of which runs the delicate mid-vein, and the intervals between the bands are paler with a parchment texture. The whole calyx we may call vittate, and it is very different from the calyx in *P. helodoxa,* Balf. fil. The inner parts of the flower are not markedly different from those of *P. helodoxa.*

One asks, Can this be a microform of *P. helodoxa,* Balf. fil.? Its characters as seen in the solitary sheet of specimens suffice

to distinguish it readily. If I give it a name, I do not overlook the possibility suggested.

Primula conica, Balf. fil. et Forrest. (Muscarioides.)

Herba rosulata efarinosa pilosa rhizomate parvo rosulis sub anthesi gemmae squamis et foliis juvenilibus basi cinctis. Folia petiolata ad 17 cm. longa ad 3.5 cm. lata ; lamina oblonga vel oblanceolata apice obtusa vel subrotundata deorsum in petiolum alatum vix distinctum subvaginatum in medio erubescentem gradatim attenuata margine sub-erosa denticulis vel crenis paucis irregularibus obtusis vel acutis et hydathodo corneo terminatis saepe decurvis utrinque concolor pilis mollibus longis albis hirsuta subtus praecipue ad venas vestita. Scapus validus ad 30 cm. altus hirsutus efarinosus spicam conicam ad 3.5 cm. longam multifloram gerens floribus deflexis imbricatis ; bracteae ligulatae obtusae basi expansae circ. 1 cm. longae virides vel apice purpurascentes pilis glandulosis ciliatae deflexae externae floribus occultae supremae purpureae plus minusve erectae et ultra flores prolatae ; pedicelli subnulli. Calyx obliquus suburceolatus circ. 4.5 mm. longus tenuis membranaceus extus intusque glanduloso-viscidus ad medium fissus tubo viridi deflexo lobis inaequalibus pilis longis glandulosis ciliatis posteriore maximo externo extus purpurascente rotundato 3.5 mm. lato apice truncato et eroso vel dentato postero-lateralibus rotundato-ovatis minoribus viridibus vel leviter purpureo-striatis antero-lateralibus minimis ellipticis vel late ovatis subacutis viridibus. Corolla tubuloso-infundibuliformis coeruleo-purpurea deflexa 1.5 cm. longa ad faucem ampliata tubo intus albescente et minutissime glanduloso-puberulo exannulato limbi concavi disco circ. 1.5 mm. lato lobis subquadratis vel subrotundatis circ. 2.5 mm. longis emarginatis. Stamina filamentis albidis conspicuis latis antheris parvis fl. brevistyli in faucem corollae antherarum apicibus vix exsertis longistyli basim versus apicibus vix calycem excedentibus inserta. Ovarium globosum viride ; stylus brevis calycem aequans pallide viridis, longus exsertus ; stigma magnum discoideum margine revolutum.

Species efarinosa Sectionis Muscarioidis scapo hirsuto, bracteis calyceque pilis glandulosis ciliatis, calyce extus intusque viscido-glanduloso, corollae lobis subquadratis emarginatis valde distincta.

"Yunnan. Chungtien plateau. Lat. 27° 30′ N. Alt. 11,000 ft. Open pasture by streams." Forrest, No. 12,707. July 1914.

This plant is a typical member of the Muscarioid Section and of that division of it, including *P. gracilenta,* Dunn, in which mealiness is absent, and like that species it has a very hairy scape.

The absence of meal from the flowers seems to be made up for by the development of viscidly-glandular short hairs over the calyx inside and out, and the margins of the calyx are fringed also with long glandular hairs. Concurrently the calyx is very thin and membranous. In *P. gracilenta* the calyx has a close covering of non-glandular hairs on the outside and is bare of them inside. One may say *P. gracilenta* is the nearest ally in the Section to *P. conica*. In addition to the calyx character, *P. gracilenta* is readily differentiated by the apiculate corolla-lobes. The behaviour of *P. conica* in cultivation so far suggests treatment for it not different from that of other members of the Section. The plant was introduced by Mr. Williams of Caerhays Castle through seed collected by Mr. G. Forrest, and flowered for the first time in 1916 with Messrs. Wallace of Colchester and also at Edinburgh.

Primula Cooperi, Balf. fil. (Candelabra.)

Aromatica epilosa. Folia petiolata sub anthesi ad 18 cm. longa ad 3.5 cm. lata; lamina membranacea viridis elongato-oblonga obtusa vel acuta margine irregulariter denticulata basi in petiolum aequilongum vel longiorem anguste alatum vaginantem attenuata subtus pallidior glanduloso-foveolata et glandulis minutis plurimis obtecta venis primariis ex costa media subtus prominula subpatenter adscendentibus; folia post anthesin accrescentia ad 27 cm. longa et 6 cm. lata. Scapus ad 20 cm. altus viridis umbellam terminalem plurifloram interdum verticillo infero praeditam gerens; bracteae ad 8 mm.longae lineares minutissime puberulae et nigro-punctatae; pedicelli filiformes ad 2 cm. longi minutissime puberuli virides deflexi sub fructu erecti stricti; anthopodium breve. Calyx tubulosus efarinosus opacus ad 7 mm. longus crassus extus scabriusculus 5-costatus ad trientem fissus, lobis elongato-triangularibus obtusis. Corollae aurantiacae ubique puberulae tubus crassus infundibularis 1 cm. longus supra stamina ampliatus annulo luteo prominulo instructus infra stamina rugosus, limbi concavi discus 1 mm. latus, lobi rotundati vel oblongi ad 8 mm. longi ad 7 mm. lati subcrenulati truncati mucronulati. Stamina floris brevistyli infra medium tubi corollini inserta; filamenta distincta; antherae 2 mm. longae apicibus ab annulo 4 mm. remotis calyce breviores. Ovarium globosum; stylus longus albus tubum corollae aequans; stigma apice depressum. Capsula globosa tubo calycis lobis patentibus inclusa primo operculatim dein irregulariter valvatim dehiscens. Semina parva 0.5 mm. diam. cuboidea brunnea subscrobiculata.

Species aromatica efarinosa *P. serratifoliae,* Franch. forsan

affinis, bracteis nigro-punctatis, corolla concolore inter notas alias distincta.

"Sikkim. Above Toong. Alt. 10,000 ft. Most distinct yellow colour. Never seen but here on sandy stream side. R. E. Cooper." No. 349. 25th July 1912. Also Nos. 892, 893. 16th Sept: 1913.

This plant we owe to Ronald E. Cooper, collector for Bees, Ltd. It is an interesting addition to the East Himalayan Candelabra Primulas. At first sight it resembles the yellow-flowered *P. obliqua*, W. W. Sm. and *P. elongata*, Watt, of Sikkim, but apart from its odour, which serves at once as a diagnostic mark, the globose operculate fruit separates it from the Section of these plants. The only other yellow-flowered Candelabra species of the northern area of the East Himalayas is *P. Smithiana*, Craib, a Chumbi plant, which may be readily diagnosed by the dense sulphur-yellow meal coating its calyx and inflorescence. The Khasian yellow Candelabras *P. prolifera*, Wall. and *P. khasiana*, Balf. fil. et W. W. Sm., both of which have no meal, have not the aromatic leaves of *P. Cooperi*, and have more delicate flower pedicels, shorter calyces, and smaller fruits. Perhaps its nearest relation amongst the yellow-flowered Candelabras is the Chinese *P. serratifolia*, Franch. but that species has a more Soldanelloid corolla with a central lemon-coloured strip on each petaline lobe.

1224 **Primula Craibeana,** Balf. fil. et W. W. Sm. (Sphaerocephala.)

Rosulata rhizomate globoso parvo radicibus plurimis foliisque plurimis erectis floribus coaetaneis. Folia in rosula 8–14 ad 12 cm. longa petiolata ; lamina chartacea circ. 1.2 cm. lata anguste oblanceolata apice acuta vel apiculata deorsum in petiolum subaequilongum anguste alatum basi subamplexicaulem sensim attenuata margine denticulis crebris argutis subregulariter denticulata supra atroviridis sed tamen glandulis stipitatis minutis fariniferis conspersa subrugulosa costa media et venulis primariis plurimis oblique ascendentibus plus minusve sulcatis subtus luteo-farinosa favoso-reticulata venarum reti eminente. Scapus rigidus ad 40 cm. altus cum bracteis plus minusve luteo-farinosus umbellam capitatam multifloram plus minusve globosam gerens ; bracteae 2–4 mm. longae ovato-lanceolatae obtusae externae recurvatae, pedicelli subnulli vel ad 0.5 mm. longi ; flores deflexi. Calyx circ. 6 mm. longus tenuis subcampanulatus luteo-farinosus tubo intus excepto vix ad medium fissus lobis erectis lanceolatis vel ovato-lanceolatis inaequalibus posteriore aliis majore acutiusculis. Corollae tubus membranaceus erubescens circ. 9 mm. longus 5-carinatus infra cylindricus supra stamina paulo inflatus extus aureo-farinosus intus pur-

pureus transverse tenuiter rugulosus minute annulatus, limbi concavi discus circ. 1.5 mm. latus, lobi circ. 3 mm. longi subquadrati erecti emarginati. Stamina filamentis conspicuis antheris 1.5 mm. longis connectivo purpureo in flore brevistylo ad faucem inserta antherarum apicibus vix exsertis. Ovarium ovoideum stylopodio coronatum; stylus brevis ovario brevior; stigma depresso-capitatum. Capsula oblongo-ovoidea calyce inclusa infra tenuiter crustacea supra incrassata valvulis 5 integris apice tantum dehiscentibus; placenta ovoidea stipite brevissimo. Semina atrobrunnea cuboidea vesiculoso-tuberculata.

Microforma *P. capitatae*, Hook. foliis anguste lanceolatis acutis supra efarinosis subtus luteo-farinosis inflorescentia globosa distinguenda.

Sikkim. Alt. 10,000–16,000 ft. J. D. Hooker.

This species was first noted in the herbarium at Kew by Mr. W.G. Craib, and he refers to it in his paper read before the Primula Conference. It differs from all other forms of the Aggregate *P. capitata*, Hook. by having yellow meal. Its nearest Indian ally is *P. lacteocapitata*, Balf. fil. et W. W. Sm. The rhizome and the form of the leaves in the two species is similar, as is also the globose inflorescence. But *P. lacteocapitata* has cream-coloured meal and is mealy on both leaf surfaces. This plant has quite yellow meal and only on the under surface. The dried specimens do not allow of a certain decision upon the colour of the petioles, but there is a suggestion of redness—one of the features of *P. lacteocapitata*. So far as I know this plant is not yet in cultivation.

Of the distribution of the species in Sikkim I cannot speak here. Two sheets of specimens in Kew Herbarium collected by Sir Joseph Hooker show the plant—mixed in each case with another species. In the Calcutta Herbarium and in that of Edinburgh are several sheets of specimens which evidently belong to the species, and these will be dealt with in an account of the whole Capitate Aggregate.

Primula crispa, Balf. fil. et W. W. Sm. (Denticulata.)

P. capitata, var. *crispa*, Hort.
P. capitata, var. *erosa*, Hort.
P. erosa, Hook. fil. in Bot. Mag. (1887), t. 6916 A. (non Wall.).

Epilosa rhizomate parvo foliis circ. 16 in rosula dispositis floribus coaetaneis. Folia circ. 8 cm. longa petiolata; lamina carnosula ad 4 cm. longa ad 1.5 cm. lata oblonga vel oblanceolata vel obovata spathulata apice rotundata circumcirca erosa vel sublobulata et crispidenticulata deorsum in petiolum aequilongum vel longiorem alatum rubrum gradatim attenuata

utrinque viridis efarinosa sed tamen glandulis parvulis capitatis stipitatis fariniferis conspersa supra rugosa costa media venulisque sulcatis subtus pallidior favoso-reticulata costa venisque elevatis. Scapus ad 20 cm. altus validus cum bracteis pedicellisque aureo-farinosus umbellam capitatam parvam saepe obliquam gerens; bracteae erectae anguste ovatae vel a basi lanceolatae acuminato-caudatae ad 8 mm. longae integrae vel denticulis subulatis paucis praeditae carinatae basi pulvinatim incrassatae; pedicelli ad 2 mm. longi anthopodio 0.5 mm. longo turbinato terminati. Calyx tubulosus circ. 7 mm. longus extus intusque aureo-farinosus ultra medium fissus lobis viridibus circ. 4.5 mm. longis a basi lanceolatis acutis subpatentibus aequalibus. Corollae tubus erubescens extus aureo-farinosus in flore brevistylo circ. 9 mm. longus intus plus minusve aurantiacus infra stamina tubulosus et rugulosus supra ampliatus et farinosus ad faucem aurantiacostrumosus vix annulatus, limbi concavi extus intusque farinosi discus circ. 2 mm. latus, lobi obcordati circ. 4 mm. diam. emarginati. Stamina in flore brevistylo filamentis brevissimis antheris magnis ad 2 mm. longis apicem tubi corollini versus inserta antherarum apicibus ad os attingentibus. Ovarium viride turbinatum stylopodio lato coronatum; stylus brevis calyce multo brevior; stigma capitatum.

Species Sectionis Denticulatae; a *P. erosa*, Wall. valde diversa et foliis carnosulis crispididenticulatis petiolisque rubris scapo floribusque aureo-farinosis facile distinguenda.

Sikkim. Ningbil. Alt. 13,000 ft. W. W. Smith. No. 4209. 11th Aug. 1910.

This is the *P. erosa* of the Bot. Mag. (1887), t. 6916. It is not the true *P. erosa*, Wall. Both this and *P. erosa*, Wall. belong to the Denticulata Section, and are easily separated from *P. capitata*, Hook. fil. and its many forms and allies by the inflorescence and flower characters. It does not appear to be a species common in cultivation. Through the generosity of Mr. G. Reuthe a plant of it came to the Royal Botanic Garden Edinburgh, and a prized gift it was, inasmuch as it enabled me to solve the problem which had previously baffled me of the identity of the plant figured in the Bot. Mag., t. 6916. The Director of Kew kindly allowed me to have for examination the dried specimen of the plant from which this figure was drawn, but I had never met with a plant in cultivation which I could match with that shown in the Bot. Mag. until I received the plant from Mr. Reuthe. There is no mistaking it. The short fleshy crisp blades of the leaf, green on both sides, and the long red petioles are in addition to its Denticulata flowers most distinctive. The

plant must not be mixed up with *P. crispata*, Balf. fil. et W. W. Sm. That is a microform of true *P. capitata*, Hook.

Only one native locality is cited here for the plant. Further examination of the rich material of primulas in the Calcutta Herbarium is required before its distribution can be ascertained.

1776 **Primula crispata,** Balf. fil. et W. W. Sm. (Sphaerocephala.)

P. capitata, Hort. in Garden (1879), 535, pl. CCX.

Rosulata epilosa foliis plurimis cum floribus coaetaneis patentibus rhizomate crasso brevi copiose radicante. Folia membranacea circ. 10 cm. longa late petiolata; lamina ad 3.5 cm. lata anguste oblonga vel oblanceolata deorsum in petiolum alatum ad 1.5 cm. latum viridem vix ab lamina discretum basi subamplexicaulem attenuata apice rotundata vel obtusa margine erosodenticulata denticulis hydathodo conspicuo terminatis utrinque viridis glandulis stipitatis inconspicuis fariniferis conspersa sed tamen efarinosa supra rugosa areolatim venulosa costa media venulisque primariis plurimis patulis sulcatis albidis subtus pallidior costa media venulisque primariis elevatis venarum reti ultimo favoso-reticulato. Scapus validus teres erectus ad 30 cm. altus cum bracteis pedicellisque dense albofarinosus umbellam capitatam discoideam multifloram gerens; bracteae infimae sub anthesi recurvatae oblongae obtusae vel subacutae integrae vel plus minusve denticulatae circ. 8 mm. longae 4 mm. latae nervo medio conspicuo supremae sub floribus inexpansis erectae subincurvatae ultra flores haud prolatae; pedicelli pallide virides ad 4 mm. longi plus minusve curvati; anthopodium turbinatum ad 2 mm. longum a calyce abstrictum. Calyx viridis ad 8 mm. longus infundibuliformis dense albo-farinosus tubo intus excepto ad medium fissus lobis aequalibus (vel posteriore paullo majore) oblongis vel ligulatis obtusis adpressis deinde subpatentibus. Corollae tubus in flore brevistylo circ. 1.2 cm. longus in longistylo circ. 1 cm. cylindricus 5-costatus membranaceus supra stamina ampliatus extus erubescens supra calycem albo-farinosus intus lilacinus vel pallide purpureus transverse rugosus ad faucem rugis lilacinis vel purpureis strumosis subannulatim notatus, limbi concavi atroviolacei supra glandulis plus minusve fariniferis conspersi circ. 8 mm. longi discus circ. 3 mm. latus, lobi elliptici vel subrotundati vel subobcordati emarginati vel sub-bifidi circ. 5 mm. longi erecti imbricati. Stamina filamentis conspicuis purpureis cum antheris circ. 1 mm. longis purpureis in flore brevistylo ad faucem tubi corollini antherarum apicibus circ. 2 mm. ab ore remotis inserta, in longistylo basim versus supra ovarium inserta calyceque inclusa. Ovarium turbinatum vertice stylopodio incrassato coronatum;

stylus brevis ovarium vix aequans longus tubo corollino brevior ; stigma albidum late discoideum lobulatum ab ore tubi corollini circ. 2 mm. remotum.

Microforma *P. capitatae,* Hook. sed robustior et foliis utrinque efarinosis petiolisque viridibus distinguenda.

" Sikkim. Laghep. Alt. 11,000 ft. Fine showy blue among mixed herbage. Meal only on head." R. E. Cooper. No. 961. 27th Sept. 1913.

This is one of the plants that has been for long in cultivation under the name *P. capitata,* Hook. The figure in the Garden for 1879 (pl. CCX) represents it. In size of all its parts it is a little smaller than *P. Mooreana,* Balf fil. et W. W. Sm., which it resembles somewhat in habit, but it is readily recognised as distinct from *P. Mooreana* by the absence of meal from both sides of the leaf. *P. crispa,* Balf. fil. et W. W. Sm. resembles it somewhat in the erosion of the leaf margins, but that species has leaves with narrow red petioles, and then its inflorescence is that of the Denticulata Section, with erect or only patent bracts, and it has golden meal. I have only cited native specimens from one locality in Sikkim. Of these there is no doubt, but I think we shall find that other specimens, particularly in the Calcutta Herbarium, belong to the species, and the area of distribution will prove to be wider than is suggested by the solitary citation here given.

Primula Dianae, Balf. fil. et Cooper. (Amethystina.)

Efarinosa epilosa rhizomate brevi radicibus erubescentibus foliorum rosulis sub anthesi gemmae cataphyllis ligulatis elongatis erectis erubescentibus plus minusve membranaceis circumcinctis. Folia glabra longe petiolata ad 12 cm. longa ; lamina membranacea oblonga vel elliptico-oblonga vel elliptica ad 6 cm. longa ad 3 cm. lata apice rotundata margine subcartilaginea denticulis minutis triangularibus hydathodo conspicuo terminatis notata basim versus integra et cuneatim in petiolum attenuata utrinque fere concolor laevis costa media venisque primariis plurimis pinnatim patulis plus minusve conspicuis ; petiolus ruber ad 6 cm. longus anguste alatus basi subamplexicaulis. Scapus ad 20 cm. altus pilis fariniferis infra sparsissime supra dense obtectus erubescens umbellam 3–8-floram gerens ; bracteae atropurpureae coriaceae involucratae parvae circ. 3 mm. longae a basi lanceolatae obtusae farinosae uninerviae extus basi subincrassatae ; pedicelli atropurpurei filiformes ad 1 cm. longi farinosi subnutantes ; anthopodium crassum turbinatum ad 2 mm. longum. Calyx atropurpureus extus intusque farinosus subcampanulatus ad 4 mm. longus crasse coriaceus ultra medium fissus tubo 5-angulato intervallis pallidioribus lobis oblongis

vel subovatis obtusis. Corollae atropurpureae in flore longistylo 2.2 cm. longae tubus circ. 1.2 cm. longus atropurpureus cylindricus supra stamina paulo ampliatus extus glandulosus intus erugulosus purpureo-annulatus fauce puberula, limbi discus circ. 2 mm. latus dense glandulosus, lobi oblongo-obovati circ. 8 mm. longi imbricati integri. Stamina infra medium tubi corollini inserta ultra calycem projecta filamentis conspicuis circ. 0.5 mm. longis deorsum expansis antheris flavidis connectivo fulvo circ. 2 mm. longis. Ovarium ovoideum; stylus longus filiformis tubum corollinum aequans; stigma ovoideum. Capsula globosa circ. 4 mm. diam. calyce inclusa irregulariter (?) dehiscens; placenta globosa brevissime stipitata. Semina angulata brunnea circ. 1 mm. diam. testa vesiculoso-tuberculata.

Species Sectionis Amethystinae foliis longe petiolatis valde distincta.

"Bhutan. Champa Pumthang. Alt. 12,000 ft. Herb in open turf in gaps of Abies forest." R. E. Cooper. No. 4000. 19th June 1915.

This is another interesting new Primula from Bhutan, helping to bind the Himalayan with the West Chinese flora. *P. Dianae* belongs to the Amethystina Section, which is typically represented in the Eastern Himalaya by the charming *P. Kingii*, Watt, and also by *P. Gageana*, Balf. fil. et W. W. Sm. From these Cooper's plant is readily distinguished by the long petiolate leaves and the corolla not velvety puberulous. The Section is more numerously represented in China by *P. amethystina*, Franch., *P. brevifolia*, G. Forrest, *P. leimonophila*, Balf. fil., *P. petrophyes*, Balf. fil., and the small *P. silaensis*, Franch. Cooper's plant takes most after *P. brevifolia*, but from all these Chinese plants, as from the Indian, the long petioled leaves at once separate it.

Primula Duthieana, Balf. fil. et W. W. Sm. (Nivalis.)

Planta rhizomate brevi alabastri squamis elongatis erectis rufescentibus submembranaceis rosulam foliorum tunicatim obtegentibus. Folia ad 20 cm. longa ad 3.5 cm. lata lanceolata vel oblanceolata vel oblongo-lanceolata acuta margine subtiliter crenulata deorsum in petiolum alatum vix distinctum attenuata glabra efarinosa. Scapus folia aequans vel vix eis longior robustus superne cum bracteis pedicellisque calyceque glandulis globosis fariniferis obsitus umbellam plurifloram (ad 20) gerens; bracteae ligulatae foliaceae ad 3.5 cm. longae ad 2 cm. latae acutae; pedicelli validi bracteis breviores vel longiores; anthopodium obconoideum. Calyx elongato-campanulatus viridis circ. 1 cm. longus ultra medium fissus lobis a basi lanceolatis venis plurimis percursis intus dense glanduloso-

puberulis. Corollae luteae concoloris tubus infra cylindricus supra stamina ampliatus in flore longistylo circ. 1.8 cm. longus in brevistylo circ. 1.4 cm. longus membranaceus erugosus annulatus annulo crenulato-lobato, limbi discus angustus vix 0.5 mm. latus puberulus, lobi oblongi vel elliptici integri ad 1 cm. longi. Stamina filamentis distinctis deorsum expansis antheris angustis circ. 2.5 mm. longis apiculatis in flore brevistylo ad faucem inserta antherarum apicibus circ. 1 mm. ab annulo remotis in longistylo infra medium antheris calyce vix brevioribus. Ovarium ovoideum stylopodio conspicuo; stylus longus tenuis tubo corollae quadrante brevior, brevis validior calyce triente brevior; stigma capitatum. Capsula cylindrica circ. 1.5 cm. longa circ. 3 mm. lata calycem haud auctum lobis intus dense luteo-farinosis dimidio excedens ab apice dentibus 5 rotundatis dehiscens; placenta columnaris brevis circ. 5 mm. longa brevissime stipitata. Semina ad 2 mm. longa nigrobrunnea complanata multiformia orbicularia vel oblonga vel fusiformia angulata semper plus minusve spongiosa.

Primulae Stuartii, Wall. affinis, bracteis longis, capsula calycem multo superante distincta.

Hazara. Bangas, Mazaffarabad. Inayat. 21st July 1897. No. 21,979*a*. In Herb. Kew.

Hazara. Chapri, Kagan. Inayat. 27th July 1897. No. 21,979; 25th July 1899; 28th July 1899. In Herb. Kew.

Hazara. Giti Dass, Kagan. Inayat. 23rd June 1899. In Herb. Kew.

Hazara. Musa, Muzaffarabad. 18th July 1899. In Herb. Kew.

Hazara. Nila, Kagan. Inayat. 21st July 1899. No. 21,979*b*. In Herb. Kew.

Hazara. Ragi bhozi, Kagan. Duthie. 23rd July 1899. In Herb. Kew.

Hazara. Uraksula, Kagan. Duthie. 25th July 1899. In Herb. Kew.

Hazara. Parchnadi, Saran Range. Inayat. 13th Aug. 1899. In Herb. Kew.

Hazara. Khunda. 22nd Aug. 1899. In Herb. Kew.

Hazara. Urni, Jabar, Saran Range. Inayat. 24th Aug. 1899. In Herb. Kew.

This plant is a dwarf *P. Stuartii*, Wall., but recognisable at sight in dried specimens at least by the long bracts of the inflorescence and then in fruit by the longer and broader capsule with larger seeds. The specimens of it I have examined are from Duthie's collection now at Kew. They have been abun-

dantly poisoned, so much so that layers of crystals of corrosive sublimate are to be found on the surface of the capsule under the calyx lobes. This poisoning may account for the absence of actual meal—excepting on the inside of the calyx lobes in fruit—on all the specimens, although the capitate glands from which meal comes are abundant. In nature the plant is, I expect, covered more or less with yellow meal.

We know it only as a North-West Himalayan form, but from none of the localities recorded for *P. Stuartii*.

Primula eburnea, Balf. fil. et Cooper. (Soldanelloides.)

Rosulata rhizomate minuto foliisque membranaceis paucis floribus coaetaneis. Folia petiolata sub anthesi magnitudine variabilia nunc 5 cm. longa nunc ad 18 cm.; lamina in foliis minoribus elliptica vel oblongo-elliptica 3 cm. longa 1.5 cm. lata in majoribus ad 9 cm. longa ad 3.5 cm. lata in omnibus apice rotundata vel obtusa margine denticulata in foliis maximis nonnunquam paulo lobulata lobulis denticulatis denticulis triangularibus minute glanduloso-ciliatis semper venulae mediae apiculo prolato terminatis basi in petiolum aequilongum vel longiorem paulo alatum basique vaginantem longe cuneatim attenuata utrinque concolor pallide viridis glandulis stipitatis plus minusve viscida costa media subtus prominula venisque primariis acute adscendentibus et superne flabellatim divaricatis. Scapus tenuis ad 20 cm. altus albo-farinosus capitulum globosum multiflorum floribus deflexis gerens; bracteae parvae circ. 6 mm. longae vix 1 mm. latae a basi ligulatae acutiusculae; pedicelli nulli. Calyx magnus laete viridis membranaceus late crateriformis ad 9 mm. longus extus intusque glandulis fariniferis stipitatis obtectus ad trientem fissus lobis inaequalibus patentibus latis subrotundatis vel late triangularibus vel oblongo-ovatis semper denticulatis obtusis vel acutis margine glanduloso-ciliatis. Corollae floris longistyli magnae circ. 2 cm. longae eburneae extus intusque glandulis stipitatis obtectae tubus circ. 1 cm. longus basi circum ovarium globosus firmus supra infundibuliformis erugulosus exannulatus tenuiter membranaceus obliquus, limbi ampliati discus concavus circ. 4 mm. latus in lobos circ. 6 mm. longos et 1 cm. latos semi-lunatos fimbriatos expansus. Stamina in flore longistylo basim tubi corollini versus supra ovarium inserta filamentis brevibus antheris circ. 2 mm. longis connectivo fulvo. Ovarium globosum stylopodio punctulato coronatum; stylus longus tenuis tubum corollinum aequans; stigma discoideum lobulatum.

Species ex affinitate *P. Reidii,* Duthie foliis evillosis, bracteis angustis, corollae lobis tenuioribus fimbriatis distinguenda.

"Bhutan. Narim Thang Kurted. Alt. 14,000 ft. Flowers

white, reflexed corolla. Growing among peaty turf and glacial debris by streams." R. E. Cooper. No. 4236. 31st July 1915.

The charming *P. Reidii,* Duthie is a plant of the N.W. Himalaya, with, as far as we know, limited distribution there. In *P. eburnea,* Balf. fil. et Cooper we have a similar plant from the Eastern end of the Himalayas—no less charming. The fact of distribution is most interesting. *P. Reidii* is the only West Himalayan species known of the Section Soldanelloides. The other Indian species, *P. sapphirina,* Hook. fil., *P. soldanelloides,* Watt, *P. Wattii,* King, and *P. uniflora,* Klatt, are all Sikkim plants ; and it is remarkable that from Bhutan we should now get not merely one of the Soldanelloides—that we might expect for the Section has several representatives further East in China—but a form of the Section which one might be excused for mistaking at first glance for *P. Reidii* itself. There are no seeds on Mr. Cooper's specimens, but one hopes there may be some in the seed collection he has sent home. The plant may contest with *P. Reidii* its place in our collections. Mr. Cooper says nothing of mealiness in the flower, and I am unable from the dried material to describe with certainty the extent to which the flowers are meally, for in these Soldanelloid forms the meal is easily removed in process of preservation. Certain is it that glands which may be meal glands occur all over the flower.

Primula Farreriana, Balf. fil. (Nivalis.)

Robusta farinosa epilosa rhizomate parvo floribus foliisque coaetaneis. Folia spathulata longe petiolata ad 2.2 dm. longa rosulata sub anthesi squamis alabastri haud cincta ; lamina ad 10 cm. longa ad 4 cm. lata oblongo-elliptica vel lanceolata vel elliptica apice obtusa vel subacuta margine obtuse et irregulariter denticulata denticulis hydathodo parvo terminatis basi gradatim vel plus minusve abrupte in petiolum latum (ad 1.2 cm.) tenuiter membranaceum vaginantem plus minusve subterraneum attenuata supra claro-viridis pilis brevibus albidis conspersa (costa media lata plana) infra dense albo-farinosa (costa media lata leviter prominula plus minusve excepta) venis primariis plurimis pinnatim ascendentibus venulis ultimis plurimis intricato-anastomosantibus. Scapus validus ad 24 cm. altus praesertim apicem versus plus minusve albo-farinosus umbellam 4–6-floram gerens ; bracteae plus minusve albo-farinosae circ. 1.5 cm. longae circ. 1 mm. latae lineares acutae basi in vaginam latam haud gibbosam abrupte expansae ; pedicelli dense albo-farinosi validi bracteis paullo breviores vel eas aequantes in anthopodium conspicuum gradatim expansi.

Calyx circ. 1.2 cm. longus atropurpureus cylindricus extus glandulis fariniferis puberulus farinaque alba conspersus fere ad basim fissus lobis ad 1 cm. longis circ. 2.5 mm. latis elongato-oblongis acutis hydathodo terminatis trinerviis intus dense albo-farinosis. Corollae tubus atropurpureus cylindricus supra stamina paullo ampliatus circ. 1.4 cm. longus in floribus heteromorphis ambobus extus glaber intus supra stamina granulosus annulatus annulo atropurpureo conspicuo 5-lobato, limbi discus circ. 2 mm. latus intus atropurpureus extus albidus plus minusve farinosus, lobi pallidiores obcordati circ. 1 cm. longi et lati apice emarginati in sinu mucronati. Stamina filamentis conspicuis fere 1 mm. longis antheris magnis circ. 2.75 mm. longis in flore brevistylo ad os tubi corollini antherarum apicibus annulum attingentibus in flore longistylo medium versus inserta calyce multo breviora. Ovarium globosum; stylus brevis calyce dimidio brevior, longus calycem subaequans; stigma parvum cylindricum.

Species Sectionis Nivalis (sensu lato) ab omnibus foliorum forma indumentoque recedens.

"Kansu. Ta-Tung Alps. Dark cold and damp gullies or tight cliff crevices in shade on calcareous or non-calcareous rock from 12,000–15,000 ft. Very sweet." Farrer and Purdom. F. 560. Primula No. 29. June–July 1915.

A beautiful species by which to commemorate the enterprise and endeavour of its name-father. I could have wished that the Primula so named had been other then one of the Nivalis Section, the members of which have hitherto proved shy in cultivation. It seems, however, that these Nivalis forms probably want rich feeding. Dr. M'Watt of Duns has had great success with *P. Parryi*, Gray planted in a rose border, and, following him, I have planted several of the section in like quarters and so far with success in the way of foliage. Certainly if we can hit off the right method for growing *P. Farreriana*, the plant will be a noble addition to our cultivated Primulas.

Primula Gammieana, King, ex scheda in Herb. Calc. (Sonchifolia ?)

P. obtusifolia, Royle var. *Roylei*, Hook. fil. in Flora Brit. Ind. iii (1882), 489 (ex parte); Watt in Journ. Linn. Soc. xx (1882), 8 (ex parte).

P. Griffithii, Pax in Eng. Monogr. Primul. (1905), 118 (ex parte).

Epilosa farinosa rhizomate parvo radicibus succulentis fibrillis filiformibus copiose suffulto et ad collum squamis paucis membranaceis elongatis primo foliorum petiolos vagina-

tim circumvolutis mox marcidis praedito. Folia petiolata ad 14 cm. longa (sub fructu multo accrescentia) ; lamina membranacea oblonga vel elliptica ad 5 cm. longa ad 2 cm. lata obtusa laevis apice nunc rotundata margine regulariter denticulata denticulis hydathodo corneo terminatis deorsum in petiolum alatum vaginantem duplo- vel triplo-longiorem attenuata subtus vix pallidior utrinque glandulis fariniferis obtecta sed plerumque in speciminibus siccis efarinosa et glandulis rubris quasi punctiformibus notata costa media lata erubescente utrinque elevata et venulis primariis impressis percursa. Scapus ad 15 cm. longus (sub fructu multo elongatus) folia vix vel paullo superans validus infra glaber superne luteo-farinosus umbellam ad 10-floram gerens ; bracteae atropurpureae plus minusve luteo-farinosae a basi lata lineari-subulatae ad 1 cm. longae pedicellis breviores ; pedicelli filiformes flexiles patentes vel subnutantes luteo-farinosi ad 1.3 cm. longi infra fructum multo incrassati ; anthopodium turbinatum conspicuum. Calyx subpoculiformis crassus atropurpureus extus intusque plus minusve luteo-farinosus ad 6 mm. longus circ. ad medium fissus lobis elongato-triangularibus vel oblongis obtusis subdivergentibus ascendentibus nervis nigris sine hydathodo conspicuo copiose percursis. Corollae crassiusculae intense purpureae tubus cylindrico-infundibularis fl. brevistyli circ. 1.2 cm. fl. longistyli circ. 1 cm. longus extus glaber supra stamina ampliatus annulo angusto purpureo instructus intus infra stamina transverse rugosus faucem versus plus minusve puberulus, limbi concavi discus 1–3 mm. latus puberulus, lobi plani lati ad 1.2 cm. lati et longi obovati vel rotundati emarginati vel retusi. Stamina filamentis conspicuis purpureis circ. 0.5 mm. longis basi latis lateraliter strumis corollinis quasi annulum formantibus conjunctis antheris circ. 1.5 mm. longis connectivo purpureo fl. longistyli fere ad medium tubi corollini vel infra inserta antherarum apicibus ab annulo circ. 4 mm. remotis calycem aequantibus, brevistyli prope os corollae inserta apicibus vix exsertis. Ovarium obturbinatum apice conoideum ; stylus atropurpureus longus vix exsertus brevis calyce vix brevior ; stigma capitatum lobatum. Capsula discoidea circ. 6–7 mm. lata vertice convexa quoad dimidium inferius calyce aucto lignoso-coriaceo cupuliformi lobis patentibus inclusa apicem pedicelli conspicue incrassati stricti divaricati coronans irregulariter operculatim dehiscens. Semina cuboidea brunnea spongiosa areolata circ. 3.5 mm. diam. columnam placentalem convexam validam lignoso-stipitatam insternentia et ab ea gradatim cadentia.

Microforma *P. Roylei,* Balf. fil. et W. W. Sm. foliorum rosulis squamis longis membranaceis vaginantibus efarinosis

circumcinctis, lamina oblonga laevi, petiolo elongato lamina multo longiore, fructu et seminibus majoribus recognoscenda.

Sikkim. Lachen, 11,000–15,000 ft. Hooker. Nos. 10 and 15. June, July 1849. Fl. deep purple like Auricula. In Herb. Calc. et Kew. Quite typical.

Nattong (Gnatong). King's Collector. No. 4342. 12th July 1877. Flowers purple; No. 4363. 13th July 1877. Flowers dark purple. In Herb. Calc.

Above Phemgaroo, 12,000 ft. Pantling. May 1885. Flowers deep purple. King's type. (Nos. 46,474, 46,519 in Herb. Clarke.) In Herb. Calc. et Kew.

Hill behind Tangu bungalow, 15,200 ft. Younghusband. 5th July 1903. In Herb. Calc. et Kew.

Yatung. Hobson. 1897. In Herb. Kew.

Sir George King recognised this species, and gave it its name on the sheets of the Calcutta Herbarium, but did not publish a description. Sir George Watt cites * the name suggesting the plant is no more than a variety of *P. Kingii*, Watt, but additional knowledge does not support this view. *P. Gammieana*, King is an Eastern Sikkim and Tibetan species having its nearest alliance in *P. Roylei*, Balf. fil. et W. W. Sm., a Western Sikkim and Nepal plant. In its type-form marked by King it is readily recognised by the long sheathing membranous scales below the leaf-rosette, by the long petioles bearing many elliptic blades, by the stout pedicels thickening much below the calyx in fruit, by the woody stipe of the placenta, and by the large seeds. In all these characters it differs from *P. Roylei*. Hooker's Lachen plants Nos. 10 and 15 are also very typical—very different from *P. Griffithii*, Watt, with which Pax joins them. *P. Gammieana*, like *P. Roylei*, is a purple-flowered species formerly referred to *P. obtusifolia*, Royle, which is, however, a N.W. Himalayan plant of the Nivalis Section, whilst *P. Gammieana* and its ally *P. Roylei* have characters of the Sonchifolia and Petiolaris groups. So far as I know, it has not come into cultivation. Only a few undoubted specimens of *P. Gammieana* in herbaria are cited here. But in the Calcutta and other herbaria are many specimens resembling it, which must be dealt with at another time. Particular attention may be directed to specimens from Eumtso La and Zemu. Dried material is not very satisfactory for the diagnosis of many of these nearly related forms, and the limits amongst the forms with which *P. Gammieana* is connected can only be determined by careful study of living plants—on the field if possible. Indian botanists in West Sikkim may find it worth while to take up the investigation.

* Watt, On Indian Primulas in Journ. R.H.S., xxix (1904), 300, 314, 319.

Primula helodoxa, Balf. fil. (Candelabra.)

Epilosa efarinosa inflorescentia calyceque exceptis. Folia varia nunc rosulata subpatula cinerea opaca circa 10–12 cm. longa 2–3 cm. lata oblanceolata vel oblongo-obovata vel lanceolata denticulata obtusa in petiolum alatum vaginantem lamina dimidio breviorem attenuata costa media lata albida vel erubescente venulisque primariis fere transverse patulis non prominulis percursa, nunc erecta viridia ad 35 cm. longa 7 cm. lata tenuia oblanceolata vel obovato-lanceolata apice rotundata in triente supremo denticulata caeteroquin integra deorsum gradatim attenuata petiolum alatum longum vaginantem formantia costa media albida latissima venisque primariis acute ascendentibus haud prominulis percursa. Scapus ad 6 dm. altus vel altior robustus umbellam terminalem et verticillos 4–5 inter se remotos plurifloros (ad 20) gerens ad nodos aureo-farinosus; bracteae variae nunc ad 7 mm. longae anguste lanceolatae acuminatae basi subconnatae pedicellis dimidio breviores nunc longissimae pedicellis vel etiam floribus longiores basi cucullatim vaginantes superne loriformes subfoliaceae margine plus minusve crenato-undulatae semper plus minusve aureo-farinosae; pedicelli ad 3.5 cm. longi graciles stricti patentes sub fructu erecti plus minusve aureo-farinosi; anthopodium obconicum distinctum. Calyx parvus 3–5 mm. longus poculiformis extus densissime aureo-farinosus costis 5 striatus intus efarinosus breviter (vix ad trientem) fissus lobis subpatentibus triangularibus acutis minutissime membranaceo-fimbriatis hydathodo corneo terminatis. Corollae aureae tubus ad 1.4 cm. longus membranaceus annulatus lobis annuli inaequalibus intus leviter transverse rugosus, limbus granulosus, lobi ad 8 mm. longi ad 6 mm. lati obovati integri leviter retuso-truncati. Antherae floris brevistyli ex ore tubi corollini vix exsertae, stamina longistyli fere ad basim inserta annulum interstaminalem incõnspicuum formantia antherarum apicibus 8 mm. ab annulo remotis. Ovarium globosum; stylus brevis calycem paullo superans, longus ad annulum attingens vel subexsertus. Capsula globosa calycis lobis adpressis inclusa stylopodio incrassato 5-areolato margine crenato coronata primo circumscissim dein valvis 5 dehiscens. Semina nigro-brunnea irregulariter angulata scrobiculata.

Species *P. Smithianae*, Craib himalayensi orientali affinis sed robustior.

"Yunnan. Hills west of Tengyueh. Alt. 5600–6000 ft. Lat. 25° N. Plant of 1–2½ ft. Flowers bright golden-yellow, fragrant. Marshy meadows." G. Forrest. No. 7561. May 1912. In Herb. Edin.

Yunnan. G. Forrest. No. 9802. March 1913. In Herb. Edin.

"Yunnan. Hills N.W. of Tengyueh. Alt. 6000 ft. Lat. 25° 10′ N." G. Forrest. No. 11,904. April 1913. In Herb. Edin.

"Upper Burma. Feng-shui-ling Pass. 8000 ft. On open or shady banks by streams, or in marshes, on fallen tree trunks, etc. 5th June 1914. Flowers sulphur-yellow, pendent. Attains a height of 1½–2½ ft. Flowers May and June." F. K. Ward. No. 1635. In Herb. Edin.

This grand species is now in cultivation through seeds sent by George Forrest to Mr. J. C. Williams of Caerhays Castle. Seedlings have been raised in abundance. It closely resembles the East Himalayan *P. Smithiana*, Craib, which is altogether a smaller plant; but the two plants will, I think, when we know more of them, prove to be geographical microforms of one aggregate.

Type specimens sent by Forrest show that the plant is variable both in foliage and in the bracts. The most of the plants under number 7561 have the smaller rosulate leaves described above, and also the small bracts much shorter than the flower pedicels. The later specimens under Nos. 9802 and 11,904 have most of them the longer leaves and the longer bracts far exceeding the pedicels, and becoming more or less foliaceous. Could one have correlated without question the leaf and bract form there might have been grounds for making a distinction between the two forms, but I do not find there is a constant association of short rosulate leaves with short bracts and long leaves with large foliaceous bracts, or the opposite. The former holds more frequently than does the latter. In the flowers I have discovered no constant difference between the two forms, although there are observable minor distinctions of size and relative length of parts. Upon the evidence before me I must unite all the plants under one specific name without making distinction of a variety, leaving the question of possible segregation for decision after more specimens have been obtained and the plants have been in cultivation.

That the plant will be an acquisition to our gardens one feels assured from the specimens Forrest has sent home. One specimen is remarkable because it shows what I have not seen in any other Candelabra Primula—a compound umbel of flowers ending the scape and umbels and compound umbels upon the lateral branches of the lower whorls of the inflorescence. A plant which "sports" in this fashion in nature, and with the bracteal variations I have described above, may be expected to show as great or greater variation under cultivation leading it along desired lines. It flowered in cultivation with Mr. Williams of Caerhays Castle in 1915, and also at Edinburgh.

Primula hylophila, Balf. fil. et Farrer. (Davidi.)

Perennis rhizomate brevi radicibus tenuibus multi-ramosis; rosula foliorum sub anthesi squamis paleaceis pallide stramineis explanatis cincta. Folia petiolata ad 9 cm. longa; lamina membranacea ad 7 cm. longa ad 4 cm. lata elliptica vel oblongo-elliptica apice rotundata margine eroso-denticulata denticulis hydathodo corneo apiculatis utrinque glandulis copiose notata et sparsim pulverulenta subtus pallidior subnitida deorsum plus minusve abrupte in petiolum brevem ad 2 cm. longum vix vaginantem attenuata. Scapus brevis tenuis ad 6 cm. longus cum bracteis pedicellisque sparsim glandulis globosis pulverulentus umbellam ad 8-floram gerens sub fructu accrescens; bracteae virides ad 7 mm. longae a basi lata egibbosa acuminatae; pedicelli ad 1.5 cm. longi stricti divaricati; anthopodium obconoideum conspicuum. Flos haud fragrans. Calyx poculiformis ad 8 mm. longus extus sparsim pulverulentus ultra medium fissus tubo flavido-viridi ad apicem constricto lobis latis imbricatis subpatentibus ovatis vel oblongo-ovatis subacuminatis nonnunquam denticulatis margine minute ciliatis laete viridibus extus intusque sparsim pulverulentis. Corollae lilacino-roseae tubus pallidior membranaceus in flore longistylo circ. 1 cm. longus infra stamina cylindricus supra ampliatus extus glaber intus erugosus puberulus annulatus annulo 10-lobato lobis majoribus 5 antipetalis minoribus interpetalis, limbi plani discus circ. 1 mm. latus minute puberulus, lobi magni ad 1 cm. longi ad 8 mm. lati obcordati apice anguste bifidi segmentis rotundatis nonnunquam fimbriatis. Stamina filamentis minutissimis antheris latis circ. 2 mm. longis exapiculatis in flore longistylo paulo infra medium tubi corollini inserta calyceque breviora. Ovarium subdiscoideum; stylus longus stigmate obovoideo lobulato exserto. Capsula ad apicem pedicelli claviformis incrassati (Farrer) discoidea calycis tubo (segmentis auctis crassiusculis radiatim patentibus) inclusa operculatim dehiscens; placenta pulvinato-discoidea seminibus ex toto obtecta.

Species Sectionis Davidi bene distincta.

"Kansu. Very abundant in all the alpine forests in rich loam and on rotten trunks not in *dense* shade. From Chago to Thunder-crown above Siku. A most lovely plant. Query section Davidi? 7000–9000 ft. Early April–May." Farrer and Purdom. F. 38. P. No. 1. In Herb. Edin.

Of this species Mr. Farrer writes:—"*Primula* No. 1. Clump perfectly powderless and glabrous, presenting an astonishing general resemblance to that of *P. vulgaris* in precisely the same situations, by woodland path-sides and in the lighter woodland glades. Leaves about $2\frac{1}{2}$–$3\frac{1}{2}$ inches long, oval obovate, drawing down to a ± short petiole, conspicuously midribbed and veined

beneath, crinkled and lettuce-like in texture, deeply and sharply erose-dentate, clothed on the upper surface in a very minute and dense coating of glands, microscopically velvety on inspection. Scape ± = the leaves, stout, lengthening and stoutening in fruit; bracts very narrow and acute, about 6 mm. long. Pedicels erect and graceful, about ¾ of an inch, stiffening but not lengthening in fruit, and thickening into a straight, fat trumpet in a way suggestive of the Davidi group. Flowers from 2–8 in a wide lax umbel; calyx-lobes not = ½ the calyx, broadly oval-pointed, sometimes faintly cut into two or three teeth, at first standing only slightly away from the tube, but then widely apart, enlarging, broadening, and thickening remarkably in fruit—as in *And. maxima*. Corolla-tube white and straight, about twice the length of the calyx, widening suddenly at the throat, with a slight constriction above in the mouth, where, at the base of each lobe, it ends in a bilobed white ray, with a greenish tinge below. Flowers ¾ inch or more, flat: lobes ± broadly heart-shaped, lilac-rose, emarginate, scentless. Capsule a flattened orb, from which stand out and above the fattened calyx lobes: seed borne on a cushion-disk (?)."

"General in the situations indicated, light woodland, cool gorges, etc., in the forest zone of the Siku district, Siku, Satanee, Chago, Ga-hoba. Sometimes in limestone loose silt in deep cañons: very prolific on rotten fallen tree-trunks, 7000–9000 ft., flowering in April and May."

The plant is, as Mr. Farrer suggests, one of the Davidi Section. We know little of this section. It includes some beautiful species, and none are now in cultivation. A plant was obtained by Veitch about 1906 from seed collected by Wilson, and was introduced as *P. ovalifolia*, Franch., one of this section. It was figured in the Gardeners' Chronicle. It died out in cultivation. I am not at all sure that Veitch's plant was true *P. ovalifolia*, Franch. More than one plant appears under the name in herbaria, as happens also in the case of *P. Davidi*, Franch. I hope ere long to be able to study the species of the alliance more fully. Meanwhile I may recall that neither *P. Davidi* nor *P. ovalifolia* has near relationship with the suffruticose species *P. bracteata*, Franch., *P. bullata*, Franch., and *P. Henrici*, Franch., with which Pax unites them in his section Bullatae.* The Section Davidi in which I place them has close connection with Sections Petiolaris and Sonchifolia—the three showing a characteristic enlargement of the scape and pedicels in fruit ripening, and for the fruit itself

* See Primulas of the Bullate Section in Trans. Bot. Soc. Edin. xxvi (1912–13), 188.

a discoid operculate capsule occupied by a broad convex placenta upon which the seeds lie.

Primula ianthina, Balf. fil. et Cave. (Candelabra.)

Elata epilosa inflorescentia calyceque sulphureo-farinosis. Folia ad 25 cm. longa ad 5 cm. lata oblonga oblanceolata apice rotundata margine venarum hydathodis denticulata deorsum in petiolum alatum loriformem vaginantem sensim attenuata utrinque glanduloso-foveolata subtus pallidiora et secretione flava glandulosa plus minusve incrustata. Scapus ad 60 cm. altus robustus ad nodos sulphureo-farinosus umbellam plurifloram et 1–2 verticillos inferos gerens; bracteae ad 7 cm. longae sub fructu auctae, a basi lata anguste lanceolatae acuminatae sulphureo-farinosae; pedicelli ad 1.2 cm. longi sub fructu aucti stricti plus minusve sulphureo-farinosi; anthopodium turbinatum conspicuum. Calyx cupulari-campanulatus 5-costatus ad 5 cm. longus extus dense sulphureo-farinosus intus tubo efarinoso lobisque sparsim farinosis ad medium fissus lobis triangulari-deltoideis acuminatis hydathodo corneo terminatis costa media prominula. Corollae violaceae in flore longistylo tubus 1 cm. longus a staminum insertione infundibuliformis extus glaber intus annulatus fauce puberulus, limbi discus 2 mm. latus puberulus, lobi obcordati vel rotundati ad 1 cm. diam. emarginati nunc mucronati. Stamina in flore longistylo basim tubi corollini versus supra ovarium inserta, filamentis conspicuis deorsum in annulum lobatum interstaminalem expansis, antheris ovoideis calyce inclusis. Ovarium globosum; stylus longus exsertus; stigma discoideum. Capsula ovoideo-globosa efarinosa brunnea stylopodio incrassato valvatim sectili et lobulato coronata. Semina (? matura) nigricantia.

P. Smithianae, Craib verosimilis floribus violaceis differt.

Sikkim. Sandakphu. 11,500 ft. Cave. 29th July 1914. In Herb. Edin.

An interesting plant which we know only in a single specimen collected by Mr. Cave. It is the only violet-flowered Candelabra Primula as yet found in Sikkim, and is quite unlike any of the other violet or purple-flowered species.

In the Calcutta Herbarium are three sheets of a Primula in fruit, with the label:—"*Primula prolifera,* Wall. Sikkim. Bhik Bhanjan. Alt. 10,000 ft. Seed Collectors. No. 11,951. Oct. 1898." These are not Wallich's plant. They have abundance of yellow meal upon the fruiting calyx, and in this resemble the Sikkim *P. Smithiana,* Craib and *P. ianthina.* There are no flowers. The fruit characters are not those of *P. Smithiana,* but those of *P. ianthina,* and the foliage is also that of the latter species, and Bhik Bhanjan

being on the west side of Sikkim, as is Sandakphu, I have little hesitation in identifying the specimens from the two localities as of the same species *P. ianthina*. I hope collectors will look for the plant, which ought to have some merit as a cultivated form.

Primula khasiana, Balf. fil. et W. W. Sm. (Candelabra.)

Efarinosa epilosa foliis plurimis rosulatis. Folia ad 25 cm. longa ad 3 cm. lata lanceolata acuta margine leviter denticulata deorsum in petiolum late alatum vaginantem a lamina vix distinctum paullo attenuata utrinque saccis tanniniferis in siccitate brunneo-punctata venis primariis e costa media plus minusve acute adscendentibus. Scapus elatus robustus umbellam pluriforam terminalem et verticillos inferos 1–2 gerens; bracteae longissimae pedicellis et floribus longiores angustae loriformes submembranaceae saepe undulatae vel crenatae et ad apicem subfoliatim expansae; pedicelli capilliformes erecti ad 1.5 cm. longi; anthopodium turbinatum. Calyx tubuloso-campanulatus ad 6 mm. longus vix ad medium fissus lobis lanceolato-acuminatis hydathodo corneo terminatis. Corollae tubus subventricosus ore constricto ad 1 cm. longus intus prominenter transverse rugosus et puberulus annulatus lobulis annuli 10 magnis per paria antipetalis, limbi patuli discus 1.5 mm. latus puberulus, lobi obovati lati bilobulati. Stamina in flore longistylo supra basim tubi corollini 2 mm. inserta filamentis deorsum expansis annulum interstaminalem formantibus, in brevistylo supra medium tubi corollini inserta filamentis longis quam antherae dimidio brevioribus, antheris annulum fere attingentibus, annulo interstaminali deficiente. Ovarium globosum; stylus brevis calyce brevior, longus fere tubum corollae aequans; stigma oblongum.

A *P. prolifera*, Wall. foliorum forma et venatione, bracteis longissimis, calyce corollaque majore, staminum insertione recedit.

Khasia. S.C. 1850. In Herb. Calc.

Khasia Hills. Native collectors of Bot. Garden, Calcutta. In Herb. Edin. et Herb. Calc.

This is a second Candelabra Primula from Khasia. It has been confused with *P. prolifera*, Wall. Sir George King has evidently suspected this identification of the specimen in the Calcutta Herbarium, and has written, "The flower of *P. prolifera* is yellow; these appear to have been purple." Were this so, we should have an easily observed diagnostic mark, but yellow-flowered Himalayan Primulas in several cases lose altogether the yellow tint when dried—*P. prolifera* is a case in point—and it would be rash to assume purple for the flower colour of *P. khasiana*. Other distinctive marks

there are in the foliage and in the inflorescence and flower, and the specific name is justified.

In the first place, it is a much more foliaged plant than is *P. prolifera*. Its rosette has a dozen and more of leaves. No specimen of *P. prolifera* shows more than five leaves. In the form of leaf and in the venation *P. khasiana* is very different from *P. prolifera*. The leaves are fairly typically lanceolate, tapering to a point, and downwards are narrowed but slightly into a broad hardly distinct petiole, whereas in *P. prolifera* they are oblanceolate or obovate spathulate, have a rounded apex, and conspicuously taper downwards into a narrowly winged long petiole. The primary veins which in *P. prolifera* come off from the midrib at about a right angle, and spread patulously outwards, in *P. khasiana* diverge from the midrib ascendingly forming an acute angle with it. The bracts are distinctive. In *P. prolifera* they are linear-lanceolate barely half the length of the pedicels; here in *P. khasiana* they exceed the pedicel and flower together, and moreover are strap-shaped often foliaceous with margins undulate. Wallich had seen a plant showing this character of the bracts in the lowermost whorl of flowers, and he regarded it as a deformed state of the ordinary bract condition in *P. prolifera*. But the plants we have in which it appears have all the other characters to which I am referring separating them from *P. prolifera*, and in no preserved specimen of true *P. prolifera* do I see an indication of the character. The flowers themselves are altogether much larger than in *P. prolifera*, the calyx at least a third larger and with longer lobes, the whole quite half the length of the wide corolla tube. In *P. prolifera* the calyx is about one-third of the length of the narrower corolla tube. The annulus in *P. khasiana* is much larger than in *P. prolifera*, and the inside of the tube is conspicuously rugose and puberulous, characters not seen in the flowers of *P. prolifera* which have been examined. The stamens of the long-styled flower in *P. khasiana* are inserted higher up the corolla tube than in *P. prolifera*, and their interposed annulus is also much larger. In the short-styled flower the stamens are nearer the mouth of the corolla in *P. khasiana* than in *P. prolifera*. The short style is longer in *P. khasiana*.

Taking all these characters, the specimens available indicate a form in *P. khasiana* distinct from *P. prolifera*—to what degree further investigation must decide. It is to be hoped that exploring collectors will soon obtain material sufficient to enable us to decide. Let me here say for the benefit of collectors that they should bear in mind Sir George King's suggestion that the flower colour may not be yellow as it is in *P. prolifera*.

Primula lacteocapitata, Balf. fil. et W. W. Sm. (Sphaerocephala.)

Planta rosulata farinosa epilosa rosula dense multifoliata foliis erectis rhizomate crasso brevi subgloboso reliquiis foliorum pristinorum coronato radices plurimas emittente. Folia petiolata sub anthesi ad 12 cm. longa deinde accrescentia; lamina circ. 9 cm. longa a petiolo vix distincta circ. 1.5 cm. lata anguste oblanceolata apice acuta nunc apiculata margine undulata recurvata dentibus angustis subaequalibus triangularibus hydathodo conspicuo terminatis irregulariter denticulata basi in petiolum sensim longe attenuata supra viridis opaca (costa media pallidiore subsulcata lateribus subrugulosis) glandulis stipitatis fariniferis conspersa et plus minusve farinosa, subtus dense eburneo-farinosa costa media elevata plus minusve excepta inter venulas acute adscendentes elevatas excavata subfavosa; petiolus circ. 3 cm. longus anguste alatus farinosus basi expansus laete ruber. Scapus circ. 30 cm. altus erectus rigidus eburneo-farinosus umbellam capitatam globosam multifloram floribus plus minusve deflexis gerens; bracteae intense farinosae basales triangulares vel acuminatae vel late oblongae obtusae vel subquadratae apice irregulariter denticulatae circ. 5 mm. longae ad 3 mm. latae auriculatae superiores ovatae vel subligulatae; pedicelli brevissimi vix 0.5 mm. longi. Calyx circ. 6 mm. longus intense farinosus subcampanulatus ad medium fissus lobis subaequalibus ovatis acutis vel obtusis integris vel denticulatis. Corolla dense farinosa tubulosa, tubus crassus extus erubescens striatus in flore longistylo circ. 1 cm. longus supra stamina abrupte ampliatus intus transverse rugosus ad faucem purpureo-annulatus lobulis 10 subaequalibus, limbi concavi erecti discus circ. 1 mm. latus, lobi atropurpurei subquadrati circ. 4 mm. longi emarginati. Stamina in flore longistylo supra calycem et medium tubi corollini inserta filamentis conspicuis atropurpureis antheris purpureis apicibus circ. 1 mm. ab annulo remotis. Ovarium magnum globosum; stylus longus tubum corollae aequans; stigma magnum discoideum recurvatum.

Microforma bene distincta *P. capitatae,* Hook. foliis rubrovaginatis subtus eburneo-farinosis supra farina conspersis, umbella globosa, corolla minore facile dignoscenda.

East Himalaya. Below Mome Samdong, 13,000 ft.; on screes, leaves mealy below. R. E. Cooper. No. 428. 2nd Aug. 1913. In Herb. Edin.

East Himalaya. Near Lachen, Sikkim. 8800 ft. R. E. Cooper. No. 438. 8th Aug. 1913. In Herb. Edin.

P. lacteocapitata is one of several forms which have hitherto been confused with *P. capitata,* Hook. This is not surprising,

for the dried material which botanists have had for study has not been ample, is unless exceptionally well preserved difficult to analyse, and indeed in the drying process loses certain distinctive characters. The plant has been in cultivation at Edinburgh for several years, raised from seed presented by the Calcutta Garden under the name *P. capitata*. It has flowered recently and the living plants have furnished the evidence which makes clear its distinctness from *P. capitata*. The vegetative parts furnish a distinguishing mark in the bright red sheath at the base of the leaves and in the creamy farina on the under side of the leaf. The upper surface too never is densely farinose, only slightly sprinkled with meal. The inflorescence is much smaller, quite globose, and the flowers have a much smaller corolla. Protected from winter damp the plant thrives from year to year, but is apt to die off during the winter if exposed to wet. It is an interesting member of the series of forms that range around *P. capitata*. Only two sets of collectors' specimens are cited above. Of their identity there is certainty. But doubtless many specimens from Sikkim now in herbaria under the name of *P. capitata* are this plant.

Primula Littledalei, Balf. fil. et Watt. (Rotundifolia.)

Planta habitu *Potentillae* pulvinatim caespitosa rhizomate crasso elongato radices rubicundas plurimas emittente foliorum scaporumque vestigiis siccis intertextis obtecto petiolis ligulatis in siccitate inter se contortis et circum scapos strictos plus minusve volutis. Gemmae squamis persistentibus elongato-acuminatis farinosis praeditae. Folia plurima longe petiolata ad 8 cm. longa sub fructu ad 12 cm. aucta; lamina subcarnosula rotundato-cordata plus minusve cucullata circ. 3 cm. diam. dentibus marginalibus triangularibus subaequalibus acutis hydathodo terminatis notata lobis basalibus rotundatis vel subtruncatis integris sinu aperto vel subclauso supra laete viridis puberula glandulis subviscidis conspersa subtus glandulis fariniferis dense vestita; petiolus tenuis circ. 5 cm. longus sub fructu longior complanatus subcanaliculatus farinosus deinde glaber erubescens angustissime alatus in vaginam tandem fuscam persistentem expansus. Scapus foliis immersus circ. 5 cm. longus sub fructu longior farinosus umbellam ad 8-floram gerens; bracteae lineari-lanceolatae acuminatae farinosae basi leviter pulvinatim incrassatae costa singula conspicua; pedicelli filiformes farinosi vix 1 cm. longi sub fructu aucti; anthopodium turbinatum parvum. Calyx subcampanulatus circ. 6 mm. longus farinosus ultra medium fissus lobis anguste ligulatis acutiusculis vel obtusis vix 1.5 mm. latis margine ciliolatis. Corollae flavae tubus in flore brevistylo cylindricus supra stamina

paulo ampliatus circ. 1.6 cm. longus extus plus minusve farinosus intus glaber annulo 5-lobato, limbi plani discus circ. 1 mm. latus, lobi aperti anguste obovati circ. 8 mm. longi plus minusve crenulati. Stamina supra medium tubi corollini inserta antherarum apicibus inclusis ab annulo 3 mm. remotis filamentis conspicuis circ. 0.5 mm. longis antheris angustis circ. 2 mm. longis apiculatis. Ovarium oblongum; stylus brevis calyce triente brevior; stigma minutum capitatum. Capsula crustacea ovoidea circ. 6 mm. longa calyce inclusa et brevior spadiceobrunnea extus intusque farinosa ab apice valvis 5 reflexis dehiscens; placenta ovoidea circ. 4 mm. longa sessilis. Semina oblonga subcomplanata spadicea circ. 1 mm. longa testa grosse vesiculosa.

Species ex affinitate *P. rotundifoliae*, Wall. habitu *Potentillae*, corollae flavae tubo angustiore multo longiore, capsula quam calyx breviore diversa; a *P. cana*, Balf. fil. et Cave foliis basi cordatis recognoscenda.

Central Tibet. Chiefly from Gooring Valley. Lat. 30° 12′ N., long. 90° 25′ E., at about 16,500 ft. Coll. St. George R. Littledale. July and August 1896. In Herb. Kew et Calc.

Tibet. Lhasa. Coll. Capt. H. J. Walton, I.M.S. 1904. Herb. Watt.

A remarkable species of the series of which the longest known species is the Nepalese *P. rotundifolia*, Wall. Sir George Watt first recognised the distinctness of the plant, marking as a new species in his herbarium a specimen collected at Lhasa by Capt. Walton when serving with the Tibet Boundary Commission in 1904. This plant has flower. Sir George Watt says: "cf. *P. rotundifolia*, Wall., but flowers yellow and petals contracted into a claw. Prof. Lipsky has shown me a good specimen in flower collected in Central Tibet, and in Kew Herbarium there is a sheet collected by Mr. St. G. Littledale also in C. Tibet." I have seen Mr. Littledale's specimen in the Kew Herbarium and also one of his collecting in the Calcutta Herbarium. The only flowers I have seen are on Capt. Walton's plants. Sir George Watt did not name the plant. The Kew specimen has a MS. name attached to it by Prof. Lipsky in 1905, whether before or after Sir George Watt's diagnosis I do not know, but the name has not been published, and with Sir George Watt I give the name above.

The plant shows conspicuously the multicipital habit of so many of its allies, with the dry mass of withered leaves and scapes underlying the living. In this perhaps more than in any other series of suffruticose Primulas the "dry" method of rotting of old members is marked by curious curvature and contortion of the petioles in contrast with the stiff

erect scapes. The old petioles might be readily mistaken for tendrils.

As a species in its series, the yellow colour of the flowers to which Sir George Watt alludes is in the state of our present knowledge diagnostic. The short fruits tell the species at once from *P. rotundifolia* and *P. cana*, Balf. fil. et Cave.

Primula mallophylla, Balf. fil. (Candelabra.)

Glabra efarinosa. Folia 12–18 cm. longa 4–6.5 cm. lata; lamina oblonga vel oblongo-obovata apice rotundata vel obtusa margine argute denticulata vel erosa basi in petiolum brevem alatum basi vaginantem attenuata costa media lata prominente rubra. Scapus robustus ad 30 cm. altus superne subtiliter pubescens umbellam terminalem et verticillos 2–3 multifloros (ad 15) gerens; bracteae longissimae 2.5–3 cm. longae pedicellos calycemque superantes exteriores foliaceae petiolatae lamina oblongo-elliptica inciso-dentata 1 cm. longa 7 mm. lata petioloque anguste alato, interiores lineares vix dentatae, omnes brunneo-lineatae late insertae saepe pedicellis basi concrescentes; pedicelli circ. 1.2 cm. longi anthopodio conspicuo. Calycis cupulari-tubulosi 1–1.4 cm. longi tubus inter segmenta pallidus, lobi 9–10 mm. longi anguste lanceolati saepe denticulati brunneo-venulosi et ad basim subgibbosi brunneo-striati apice hydathodo tuberculari terminati. Corollae lilacinae in floribus longistylis tubus membranaceus circ. 1.3 cm. longus calyce inclusus ruber intus supra stamina sparsissime puberulus annulatus annulo aequaliter lobato, limbi discus puberulus, lobi obovati 9 mm. longi retusi sinu mucronulato margine crenulato-erosi. Antherae apicibus ab annulo circ. 3 mm. remotis. Ovarium ovoideum; stylus longus exsertus; stigma globosum. Capsula 6 mm. longa ovoidea calyce semi-inclusa stylopodio lobulato inconspicuo coronata primo circumscissim dehiscens postea irregulariter fissa. Semina nigra subcubicalia circ. 1 mm. diam. foveolata.

Ab omnibus speciebus purpureis Sectionis Candelabrae bracteis et calycis segmentis longissimis dignoscenda.

Eastern Szechwan. District of Tchen-kéou-tin. Farges. No. 1181. In Herb. Kew, Edin., and Bonati.

A distinct and easily recognised species hitherto confused with *P. japonica*, A. Gray. In foliage the plant has the facies of other members of the Candelabra Section, with venulose leaves, most nearly those of *P. japonica*. From the few specimens I have seen I think it is likely that the plant has in general broader leaves than other species. Perhaps its nearest ally is *P. stenodonta*, Balf. fil. Its distinctive characters lie in the bracts and the calyx. The former are very long, reaching in the case of each flower beyond the calyx, and at its end each

bract—the outer ones particularly—expands more or less into an incised green laminar portion. Then the calyx is cut deeply to far below the middle, the segments—long linear-lanceolate—are adpressed to the red corolla tube which they exceed in length and each of them ends in a rounded hydathodal knob.

I have described the plant from two sets of specimens distributed from the Paris Herbarium under the number 1181 of Farges' collecting. One of these sets in the herbarium of Kew and also of Edinburgh is named *P. japonica*, A. Gray ; the other, in the herbarium of Kew and also of M. Gustav Bonati of Lure, is named *P. angustidens*, Pax. Under *P. stenodonta*, Balf. fil. I shall explain the constitution of *P. angustidens*, and need say no more here. From *P. japonica* the characters of the bracts and of the calyx of *P. mallophylla* are decisively diagnostic. The calyx character is one indeed that separates it from all others in the Candelabra Section. The calyx segments are either shorter than, or barely equal to, the calyx tube in these ; in *P. mallophylla* they are twice as long. Long bracts occur in the yellow-flowered *P. imperialis*, Jungh. and *P. Bulleyana*, G. Forrest ; but in neither of these are they so long relatively to the whole flower as in *P. mallophylla*, nor have they the laminar expansion at the end of the bract. *P. chrysochlora*, Balf. fil. et Ward, *P. helodoxa*, Balf. fil. et Forrest, and *P. prolifera*, Wall. have long bracts, to which reference is made under these species. The species stands apart by itself in the section in which there is no doubt it is rightly placed.

The appearance of the plant in herbarium specimens seems to indicate that it is a desirable species for our gardens.

243 **Primula Menziesiana,*** Balf. fil. et W. W. Sm. (Muscarioides.)

Rosulata glanduloso-pubescens efarinosa floribus exceptis. Folia patentia ad 3.5 cm. longa petiolata ; lamina circ. 2 cm. longa 1.3 cm. lata elliptica circumcirca pilis longis simplicibus glandulosis cincta apice rotundata margine regulariter crenata (cum denticulis paucis hydathodo conspicuo terminatis) basi in petiolum ad 1.5 cm. longum paullo alatum glanduloso-pilosum infra subexpansum vix vaginatum abrupte contracta utrinque laete viridis glanduloso-pubescens costa media et venis primariis paucis utrinsecus circ. 6 pinnatim patulis supra sulcatis subtus elevatis subrugulosa. Scapus ad 8 cm. longus viridis glanduloso-pubescens capitulum florum radiatim patentium subdeflexorum gerens ; bracteae externae virides deflexae ligulatae calycem aequantes margine lacteo-farinosae internae erectae haud

* The specific name is given to keep in memory Private Alan Menzies, 5th Batt. Cameron Highlanders, a young gardener of the staff of the Royal Botanic Garden, Edinburgh, who fell in action at Loos on 25th September 1915.

deflexae. Calyx foliaceus obliquus poculiformis pallide viridis sepalo posteriore saepe pallide purpurascente subventricosus circ. 5 mm. longus extus glaber intus lacteo-farinosus ultra medium fissus lobis inaequalibus posteriore quadrato circ. 3 mm. longo et lato apice truncato vel concavo sub-eroso margine ciliatim farinoso antero-lateralibus oblongis vel sublanceolatis angustis circ. 1 mm. latis obtusis margine ciliatim lacteo-farinosis. Corollae in flore brevistylo tubus infra cylindricus circ. 8 mm. longus albido-lilacinus extus glaber supra stamina ampliatus et pullo-violaceus intus rugosus albidus exannulatus, limbi concavi anguste pullo-violacei discus glaber circ. 2 mm. latus strumis interpetalinis albidis oculatus, lobi erecti circ. 2 mm. longi 4 mm. lati obovati bifidi segmentis obtusis. Stamina in flore brevistylo infra os corollinum inserta filamentis albidis conspicuis antheris semiexsertis connectivo erubescente. Ovarium discoideum viride depressum; stylus brevis pallide viridis calyce longior; stigma discoideum depressum lacteum.

Species *P. bellidifoliae*, King proxima sectionis Muscarioidis foliis minoribus lamina elliptica basi subito angustata subrugulosa, scapo glanduloso-pubescente, corolla quam calyx vix triplo longiore lobis bifidis, antheris in flore brevistylo semiexsertis recedens.

Bhutan. In sandy crevices and rocky ledges, preferring shaded N.-facing situations at elevations 13,000–15,000 ft. Flowers deep blue. Head 1 inch in diameter. Cooper. No. 3470. 1914.

A charming little plant now in cultivation, discovered in Bhutan by Mr. Roland E. Cooper, collector for Bees, Ltd. Its nearest ally is *P. bellidifolia*, King, hitherto the only Himalayan species known of the Muscarioid Section. Cooper's discovery is therefore a link in the chain, which will doubtless in time be completed, uniting the Himalayan with the Western Chinese areas—in the latter we know of nine species—of distribution of the section. *P. Menziesiana* as a cultivated species has the merits and demerits of its section. Its soft hairy leaves suggest sensitiveness to our winter damp. Its flowers are amongst the brightest in the section. They are shorter and broader than in *P. bellidifolia* and radiate from the head more horizontally than is usual in the section, save in forms of *P. nutans*, Franch. The uppermost calyx lobes are daintily picked out at margin with yellow meal. The corolla limb is much larger than in *P. bellidifolia*, and the lobes are distinctly bifid.

1721 **Primula Mooreana,** Balf. fil. et W. W. Sm. (Sphaerocephala.)

Albo-farinosa epilosa rhizomate parvo foliis plurimis rosulatis floribusque coaetaneis. Folia membranacea ad 15 cm. longa;

lamina ad 4 cm. lata oblongo-obovata vel oblanceolata deorsum in petiolum viridem vix ab lamina discretum circ. 2 cm. latum vaginantem brevem alatum attenuata apice rotundata margine obscure lobulata lobulis irregulariter denticulatis denticulis crebris acuminatis hydathodo corneo terminatis supra viridis rugosa areolatim venulosa glandulis globosis stipitatis albo-fariniferis conspersa sed tamen efarinosa costa media pallide viridi venis primariis plurimis patulis sulcatis, subtus dense albo-farinosa venis omnibus prominulis ultimis intricatim favoso-reticulatis. Scapus ad 4 dm. altus robustus erectus teres dense albo-farinosus umbellam capitatam multifloram discoideam gerens ; bracteae albo-farinosae ligulatae vel oblongae integrae vel apicem versus interdum denticulatae ad 1.5 cm. longae ad 4 mm. latae ultra flores juveniles prolatae calycem sub anthesi aequantes acutae vel acuminatae vel apiculatae exteriores basi pulvinatim incrassatae ; pedicelli breves nonnunquam subnulli albo-farinosi ad 5 mm. longi plerumque erubescentes sub anthesi deflexi anthopodio meniscoideo terminati. Calyx ad 9 mm. longus campanulatus ad medium vel ultro fissus dense albo-farinosus tubo intus excepto, lobis erectis adpressis a basi lanceolatis acuminatis aequalibus vel posteriore paullo majore. Corollae extus supra calycem albo-farinosae tubus in flore longistylo circ. 1.4 cm. longus infra cylindricus sursum subinflato-infundibuliformis 5-carinatus in brevistylo circ. 1.2 cm. longus subcylindricus ad os inflatus extus erubescens intus viridescens basi rubescente excepto transverse rugosus ad faucem rugis supremis strumosis quasi annulatus, limbus concavus circ. 1 cm. longus haematoxylo-violaceus glandulis fariniferis conspersus, lobi erecti imbricati ad 6 mm. longi ad 6 mm. lati obovati vel sub-quadrati vel subrotundati emarginati subpatentes. Stamina in flore longistylo basim tubi corollini versus inserta calycis tubo breviora in brevistylo medium versus inserta antherarum apicibus ab ore 6 mm. remotis filamentis conspicuis plus minusve purpureis, antheris luteis connectivo atropurpureo. Ovarium depresso-globosum vel turbinatum ; stylus longus calycem aequans ; stigma magnum depresso-capitatum 5-lobatum viride. Capsula ovoidea circ. 5 mm. longa calyce corollaque inclusa membranacea ab apice firmiore valvis 5 dehiscens ; placenta globosa magna brevissime stipitata ; semina minuta 0.5 mm. longa reniformia spadicea testa membranacea tuberculata.

Microforma *P. capitatae*, Hook. sed robustior et foliis majoribus apice latis rotundatis supra viridibus efarinosis rugulosis, umbella floribusque majoribus distinguenda.

East Himalaya :—

Sikkim. 10,000–16,000 ft. Coll. J. D. Hooker in Herb. Kew. (Farina fere omnino delapsa vel detersa.)

Lachoong, Sikkim. 10,000–11,000 ft. 29th Aug. 1849. Coll. J. D. Hooker in Herb. Kew.

Yeumtong, Sikkim. 13,000 ft. 5th Sept. 1849. Coll. J. D. Hooker in Herb. Kew.

Jongri, Sikkim. 8th Oct. 1862. Coll. T. Anderson. Nos. 829, 830 in Herb. Calc.

Lachen, Sikkim. 1901. Coll. Prain's Coll. No. 310 in Herb. Calc.

Lamteng (=Lachen). 20th Sept. 1903. Coll. D. Prain in Herb. Calc.

Thangu (=Tungu). Sept. 1903. Coll. D. Prain in Herb. Calc.

This is one of the plants that have been in cultivation under the name *P. capitata*, Hook. It is the large-leaved, large-flowered plant which flowers in late summer—the best of all the plants in cultivation under the name *P. capitata*. From true *P. capitata*, Hook. and all the plants cultivated under the name it may be distinguished at sight by its large leaves with coarsely reticulate, almost honeycombed, snow-white under surface and the bright green upper surface which, although it has scattered meal-bearing glands, never becomes white.

Six distinct plants are now in cultivation under the name *P. capitata*, Hook. with or without a varietal qualification. Of these the *P. capitata*, var. *crispa* of gardens is the same as the garden plant *P. capitata*, var. *erosa*, and is not a form of the aggregate *P. capitata*, Hook. but is one of the aggregate *P. denticulata*, Sm. (see p. 160). Excluding it then, we have five plants, which are *P. capitata*, Hook. or microforms of it. Four are Indian, one is Chinese. They are easily distinguished as they grow, and it may be helpful if I give here the following key by which anyone can at sight distinguish them :—

1. Leaves on both surfaces green. Leaf-base green.
   Capitate umbel discoid. Corolla-limb open . *crispata.*
   Capitate umbel globose. Corolla-limb funnel-shaped . . . . . *pseudocapitata.*

2. Leaves on under side snow-white with meal. Leaf-base green. Capitate umbel discoid.
   Upper leaf-surface more or less whitened with meal. Corolla-limb open . . . *capitata.*
   Upper leaf-surface green. Corolla-limb open . *Mooreana.*

3. Leaves on under side cream-coloured with meal. Leaf-base red.
   Upper leaf-surface more or less whitened with meal. Capitate umbel globose. Corolla-limb funnel-shaped . . . . . *lacteocapitata.*

There are other distinct microforms not yet in cultivation, e.g. *P. atrodentata,* W. W. Sm., *P. Craibeana,* Balf. fil. et W. W. Sm., *P. sphaerocephala,* Balf. fil., but I reserve comments upon them for a comprehensive treatment of the whole aggregate.

1675 **Primula moschophora,** Balf. fil. et Forrest. (Bella.)

Herba pusilla caespitosa farinosa stolonifera; stolones ad 7 cm. longi infra rosulam apicalem nudi albo-farinosi inter muscos hepaticasque pervadentes. Folia rosulata petiolata ad 1.5 cm. longa; lamina oblonga vel elliptica vel obovata vel subrhomboidea vel anguste subspathulata circ. 7 mm. longa circ. 4 mm. lata apice obtusa vel subtruncata vel subrotundata margine varie dentato-lobata deorsum in petiolum alatum lamina longiorem attenuata supra sordide viridis et glandulis fariniferis sparsim pulverulenta subtus dense albido-farinosa costa media et venis primariis regulariter ascendentibus subtus plus minusve conspicuis percursa. Scapus tenuis circ. 1.5 cm. longus folia superans vel vix superans minutissime albido-farinosus florem unum terminalem gerens; bracteae duae alternae glandulis fariniferis plus minusve vestitae subcalycinae superior major ad 3 mm. longa anguste lanceolata inferior subfiliformis minor; pedicellus nullus vel nunc 1 mm. longus; anthopodium obconoideum. Calyx infundibularis plus minusve albo-farinosus ultra medium fissus tubo extus 5-angulato lobis elongato-triangularibus vel oblongo-triangularibus subcarinatis costa media et venulis duabus lateralibus percursis apice acutis hydathodo verruculoso conspicuo terminatis. Corollae lilacinae tubus in flore longistylo tenuis in floribus heteromorphis ambobus circ. 1 cm. longus extus glaber intus ad faucem pulvinato-villosus infra in flore brevistylo transverse subrugosus, limbi concavi discus circ. 1.5 cm. latus pulvinato-villosus, lobi cuneati circ. 0.5 mm. longi ad quadrantem bifidi segmentis oblongis divaricatis. Stamina filamentis brevissimis in flore brevistylo ad os tubi corollini in flore longistylo basim versus inserta calyce inclusa. Ovarium stylopodio incrassato coronatum ovoideum; stylus longus tubum corollinum aequans, brevis calycis tubum aequans; stigma parvum subcapitatum.

Species *P. bellae,* Franch. proxima, ab ea foliis albo-farinosis haud inciso-lobatis lobis calycinis elongato-triangularibus acutis recedens et in sectione Bella stolonibus longis recognoscenda.

Yunnan. Shweli-Salween divide. Lat. 25° 30′ N. Alt. 11,000 ft. Moist stony pastures. G. Forrest. No. 12,076, Aug. 1913. In Herb. Edin.

This is a distinct plant of the Bella aggregate at sight recognisable by its stolons. One ought to call them offsets. The pompon of the corolla throat is not so dense as in typical Bella.

Taking the pompon in the corolla throat as typical of the Bella series the following ten species belong to it :—*P. bella*, Franch., *P. Bonatiana*, Petitm., *P. coryphaea*, Balf. fil. et Ward, *P. indobella*, Balf. fil. et W. W. Sm., *P. magnobella*, Balf. fil. et Forrest, *P. moschophora*, Balf. fil. et Forrest, *P. nanobella*, Balf. fil. et Forrest, *P. oreina*, Balf. fil. et Cooper, *P. pusilla*, Wall., *P. sciophila*, Balf. fil. et Ward.

Geographically we have :—

Central and Eastern Himalaya—*P. pusilla*.

Bhutan—*P. indobella, P. oreina*.

E. Upper Burma—*P. coryphaea, P. sciophila*.

Yunnan—*P. bella, P. Bonatiana, P. moschophora, P. magnobella, P. nanobella*.

1474 **Primula optata,** Farrer. (Nivalis.)

Farinosa rhizomate brevi crasso ramoso radices plurimas rubras emittente et rosulas caespitosas vestigiis fibrosis foliorum vetustorum nec squamis paleaceis tunicatas gerente. Folia ad 7 cm. longa oblanceolata vel spathulato-oblonga ad 1.5 cm. lata obtusa margine regulariter serrulata utrinque glandulis globosis fariniferis obsita subtus pallidiora plerumque linea farinosa marginali decorata deorsum in petiolum breviter vaginantem laminam subaequantem vel ea breviorem attenuata. Scapus crassus humilis folia triente excedens ad 12 cm. longus viridis vel paullo purpurascens dense albo-farinosus umbellam globosam ad 10-floram (rarissime verticillum inferum) gerens ; bracteae nigro-purpureae a basi circ. 2 mm. lata acuminatae ad 8 mm. longae pedicellos subaequantes praesertim intus plus minusve albo-farinosae ; pedicelli breves vix 1 cm. longi validi copiose albo-farinosi ; anthopodium latum turbinatum. Calyx crassus nigro-purpureus extus sparsim albo-farinosus elongato-campanulatus circ. 1 cm. longus corollae tubo paullo brevior ultra medium fissus, lobis elongatis oblongis obtusis vel subacutis intus dense farinosis. Corollae violaceo-coeruleae tubus membranaceus concolor extus efarinosus infra stamina cylindricus supra ampliatus in flore brevistylo circ. 1.3 cm. longus in flore longistylo circ. 1.1 cm. longus intus erugosus supra stamina puberulus annulatus annulo angusto membranaceo-lobato pallidiore, limbi paullo cupuliformis discus circ. 1.5 mm. latus extus basi sparsim farinosus supra sparsim puberulus, lobi longe elliptici nervulis 5–7 vix ramosis neque anastomosantibus percursi circ. 1 cm. longi et 6 mm. lati integri apice rotundati vel obtusi. Stamina filamentis brevissimis antheris latis aurantiacis circ. 2 mm. longis apiculo nullo in flore brevistylo breviter supra medium tubi corollini (antherarum vix calycem excedentium apicibus ab annulo circ. 3 mm. remotis) in flore longistylo in triente infero tubi corol-

lini (antheris vix calycis tubum aequantibus) inserta. Ovarium breviter oblongum; stylus longus vix calycem aequans, brevis vix calycis tubum aequans: stigma parvum cylindricum lobulatum. Capsula cylindrica circ. 2 cm. longa et 4 mm. lata pallide straminea nitida muro subpaleaceo haud incrassato calycem tenuem haud auctum vix dimidio excedens apice dentibus 5 concoloribus brevibus saepe fissis dehiscens; placenta cylindrico-claviformis sessilis circ. 8 mm. longa. Semina oblonga angulata paullo spongiosa subcomplanata circ. 1.75 mm. longa fusco-brunnea.

Species Sectionis Nivalis bene distincta.

" Kansu. Probably this is a variety or subspecies of P. No. 22 which is much stouter in growth, with leaves upstanding, revolute, of dark leathery green gloss, and with an invariable definite band of silver powder round their under margin, this being *very* rarely present in P. No. 10, where leaves are also explanate, more outlying, and of a bright emerald gloss. In both plants the capsule is very much as in *P. Maximowiczii*, a far-protruding chaffy-pale cylinder, transparent towards the flat top. Both inhabit *bare* solitary places in the red or yellow loam of the very topmost slopes and arêtes only, from 12,000–14,000 ft., among the shingle, and both stand off from *P. nivalis* in their lack of any long stock, or any stock at all, as in their healthy matted masses of white fibres, thrown off from abundant tough main roots of red." Farrer et Purdom. June 1914. F. 122. P. No. 10.

Mr. Farrer says also :—" Primula No. 10 (Section Nivalis, but very distinct) (*P. 'optata'*). Very much more charming than No. 8, and promising better, having no long stock, and being much more abundant in its zone of distribution. The leaves develop *while* the scape breaks into flower, at 3–4 inches: they are explanate and scarcely revolute, bright lucent green, obovate lanceolate, shorter, broader, more rounded and splayed out than in No. 8, set with regular sharp triangular teeth, diminishing to a ± marked petiole, powderless below, but often dusted with farina on the upper face, and round the dentation of the younger leaves. Scape densely white, farinose, bracts narrow lanceolate, dark, pointed, about 4–5 mm. ± = the pedicels. Calyx purple, farinose, densely so within, and outlined without, the lobes rather more than half its length, oval lanceolate, tube exceeding the calyx: limb cupuliform or like a shallow saucer (not a flat star, as in No. 8) scantily powdered on the outside at the base of the throat: lobes broadly ovate or obovate (ampler and larger than in No. 8) emarginate and sometimes toothed: of a lovely melting lavender blue, with a darker eye, and a strong sweet Primula fragrance overlaid by a yet stronger one of cupboards and mice.

Many flowers to the scape (which lengthens to about 8 inches in fruit), and a secondary tier is often borne, but hardly rises distinct above the first : the pedicels are shorter and stiffer than in No. 8 so that the head is a dome of blossom rather than a rayed wheel."

" Abundant in half-dry beck-beds of limestone, in red earth and ordinary limy loam full of chips, from 12,000 ft. up to the highest arêtes at 14,000 ft. (where it is most at home, in the sharply sloping soil-slides) of the great limestone mountain above Siku." June–July.

A really fine species.

1698 **Primula oreina,** Balf. fil. et Cooper. (Bella.)

Suffruticosa prostrata epilosa rhizomate lignescente subcrasso ramoso repente foliorum vestigiis siccis dense obtecto. Folia petiolata subspathulata parva ad 1.5 cm. longa ; lamina subcarnosula suborbicularis circ. 7 mm. longa et lata margine cartilaginea integra vel paulo et regulariter crenulata revoluta basi in petiolum aequilongum alatum circ. 3 mm. latum abrupte contracta supra atro-viridis glaber laevis venarum reti occulto subtus dense aureo-farinosa costa media prominula. Scapus tenuis ad 2 cm. longus foliis paulo longior aureo-farinosus flores 1–2 pedicellatos umbellatim gerens ; bracteae 4, inferiores 2 magnae fertiles cyclicae purpurascentes et farina aurea conspersae margine glanduloso-ciliatae plus minusve cucullatae et amplexicaules inaequales externa major circ. 6 mm. longa 5 mm. lata subpalmatifida lobis 3 obtusis venisque flabellatim divergentibus superiores 2 minores steriles parvulae virides ; pedicelli circ. 3 mm. longi aureo-farinosi. Calyx poculiformis extus intusque (tubo intus excepto) plus minusve aureo-farinosus circ. 6 mm. longus purpurascens ultra medium fissus lobis ligulatis integris obtusis venula media conspicua glanduloso-ciliatis circ. 2.5 mm. latis. Corollae lilacinae crassiusculae in flore brevistylo circ. 1.4 cm. longae tubus cylindricus supra stamina ampliatus circ. 9 mm. longus extus glandulis fariniferis conspersus intus erugosus puberulus minute annulatus fauce pilis plurimis ex ore prolatis barbatim occlusus, limbi plani plus minusve puberuli discus circ. 1 mm. latus, lobi obovati circ. 7 mm. longi aperti bifidi segmentis divaricatis. Stamina ad medium tubi corollini antheris calycem superantibus antherarum apicibus ab annulo circ. 2.5 mm. remotis inserta filamentis conspicuis deorsum expansis antheris circ. 1.5 mm. longis connectivo fulvo. Ovarium discoideum stylopodio lato coronatum ; stylus brevis vix 1 mm. longus calyce multo brevior ; stigma parvum discoideum. Capsula oblonga crustacea circ. 8 mm. longa calyce intus dense farinoso omnino inclusa ab apice valvis 5 saepe 10 brevibus dehiscens ;

placenta parva discoidea longe stipitata. Semina cuboidea circ. 1 mm. diam. helvola longe vesiculoso-tuberculata.

Species Sectionis Bellae foliorum forma orbiculari integra vel paulo crenulata bene distincta.

"Bhutan. Narim Thang Kurted. Alt. 14,000 ft. Flowers large, delicate, purple magenta, solitary. Leaves small, gold below, remaining on stem which rambles among scree debris, etc., for several inches." R. E. Cooper. No. 4247. 31st July 1915.

"Bhutan. Singhi. Kurted. Alt. 16,000 ft. Magenta flowers. Creeping among glacial debris." R. E. Cooper. No. 4973. Sept. 1915.

We have here a striking new species of the Bella Section, differing particularly in foliage and habit from those we already know. This is a woody spreading plant of glacial screes at high elevation, and its habit, as well as form of leaf, recall particularly the features of the Chinese *P. dryadifolia,* Franch. and *P. philoresia,* Balf. fil. et Ward. It is quite a Dryas-like plant. But its flower characters are those of the Bella Section—bracts —calyx—corolla. *P. indobella,* Balf. fil. et W. W. Sm. is the only species of the Section known hitherto to occur outside China, and *P. oreina* is therefore an interesting further link between the flora of the Himalayan and the Yunnan Alps.

1376 **Primula plebeia,** Balf. fil. (Petiolaris.)

Parva epilosa rhizomate tenui foliis longe petiolatis. Folia ad 7 cm. longa ; lamina elliptica vel oblongo-elliptica vel subrotundata ad 4 cm. longa ad 2–2.5 cm. lata membranacea subtus pallidior margine sinuato-dentata basi abrupte cuneatim in petiolum vix alatum limbo longiorem attenuata utrinque glandulis globosis brevissime stipitatis videlicet fariniferis sed in speciminibus siccis farinae inopibus conspersa. Scapus ad 5 cm. longus foliis brevior vel vix longior tenuis praesertim apicem versus cum bracteis pedicellisque glandulis forsan fariniferis plus minusve puberulus umbellam 2–4-floram gerens ; bracteae virides circ. 5 mm. longae pedicellis breviores lineari-lanceolatae acutae plus minusve et minutissime ciliatae ; pedicelli ad 8 mm. longi stricti graciles superne in anthopodium circ. 1.5 mm. longum gradatim incrassati. Flores rosei. Calyx circ. 5 mm. longus cupularis laete viridis glandulis forsan fariniferis obscure puberulus ad medium fissus lobis oblongis apice triangulari-acutis integris uninerviis subpatentibus. Corollae tubus in flore brevistylo infundibularis circ. 7 mm. longus calycem superans in flore longistylo circ. 5 mm. longus calyce fere inclusus extus glaber intus annulatus erugosus, limbi concavi discus circ. 1 mm. latus, lobi patentes circ. 6 mm. longi obcordati vel obovati profunde emarginati. Stamina filamentis distinctis floris brevistyli ad

os corollae antherarum apicibus exsertis, longistyli basim versus apicibus calycem vix superantibus inserta. Ovarium globosum; stylus brevis calycis tubo brevior; stylus longus exsertus; stigma parvum.

Species Sectionis Petiolaris ex affinitate *P. taliensis*, G. Forrest et *P. odontocalycis*, Pax; ab hac foliis longe petiolatis, scapo longiore pedicellisque brevioribus, calycis lobis edenticulatis, ab illa foliis calyceque epilosis facile distinguenda.

Valleys of Tse-tshou-pa. Alt. 8700 ft. Flowers rose. May. E. E. Maire.

A well-distinguished species amongst the Chinese members of the Section Petiolaris.

1013 **Primula prenantha,** Balf. fil. et W. W. Sm. (Candelabra.)

Vix rhizomatica. Folia chartacea opaca pauca rosulata petiolata ad 10 cm. longa (rarissime 12 cm.) ad 3 cm. lata, oblongo-obovata apice rotundata margine eroso-dentata denticulis hydathodo corneo terminatis, deorsum in petiolum lamina duplo breviorem alatum vaginantem sensim attenuata, supra areolatim sulcata subtus pallidiora subcinerea intricatim venuloso-reticulata venis primariis patulis obscure pulverulenta. Scapus tenuis rufus ad 15 cm. altus (sub fructu ad 25 cm.) umbellam solitariam 4–7-floram gerens rarius verticillo infero instructus nodos versus puberulo-pulverulentus; bracteae infimae ligulatae ad 7 mm. longae pedicellis dimidio breviores saepe denticulatae et ad apicem subexpansae, superiores a basi lanceolatae acuminatae plus minusve pulverulentae; pedicelli ad 1.4 cm. longi validi deflexi (sub fructu erecti stricti) puberulo-pulverulenti; anthopodium inconspicuum. Flores parvi nutantes. Calyx campanulatus circ. 4.5 mm. longus crassus extus costatus inter costas tenuior rubro-striatus glandulis globosis sparsim pulverulentus breviter fissus lobis inaequalibus deltoideis vel elongato-triangularibus vel liguliformibus plus minusve denticulatis vena media prominula hydathodo verruculoso terminata. Corollae flavae (fid. Gammie) tubus circ. 7 mm. longus tubulosus annulatus intus supra stamina transverse rugosus, limbus concavus, lobi subquadrati erecti ad 2.5 mm. longi retusi. Floris brevistyli stamina sub annulum inserta filamentis antheris aequilongis, longistyli supra medium tubi corollini inserta antherarum apicibus circ. 1 mm. ab annulo remotis. Ovarium globosum; stylus brevis calyce longior vix antheris brevior, longus antheris vix longior; stigma magnum. Capsula subglobosa 5 mm. diam. rufa calycis tubo semi-inclusa stylopodio inconspicuo. Semina (matura ?) complanata.

Species *P. proliferae*, Wall. affinis sed omnino minor et foliis

eroso-dentatis, scapo vix ad 15 cm. alto, floribus parvis, corolla concava, stylopodio inconspicuo diversa.

Sikkim. Jongri. 12,000 ft. King's Collector. June 1888; Gammie. No. 208. 27th June 1891. Flowers yellow. In Herb. Calc.

Sikkim. Near Talung. 9000 ft. Cave. No. 108. 16th July 1906. In open ground, boggy. Flowers yellow, fragrant. In Herb. Calc.

In the Calcutta Herbarium is a series of specimens of three different collectings in the neighbourhood of Jongri which show a small rosulate plant, said to have yellow flowers by two of the collectors. The plant cannot be identified with any described species, and is here therefore described. On one of the sheets has been written "*Primula prolifera*, Wall., reduced form." This is suggestive. There is little doubt about its being an ally of Wallich's species—but it is not the same.

Like other Candelabras *P. prenantha* shows the globose glands which give pulverulence, and it may be therefore more or less farinose. It recalls in habit the Chinese *P. Cockburniana*, Hemsl. It has, like it, few leaves in the rosette, and probably they are patulous in the living plant. The terminal umbel is few-flowered, and no more than one whorl of flowers below it is ever shown. The stylopod so marked in *P. prolifera*, Wall. and its allies is here not so conspicuous. It is the smallest of the Himalayan Candelabras.

Primula pseudocapitata, F. K. Ward. (Sphaerocephala.)

Rosulata epilosa rosulis multifoliatis caespitosis rhizomate parvo. Folia membranacea floribus coaetanea ad 8 cm. longa ad 3 cm. lata oblongo-spathulata vel oblanceolata apice subrotundata vel subpraemorsa margine irregulariter denticulata neque erosa neque crispidenticulata glandulis ciliata deorsum in petiolum laminam aequantem alatum alis integris sensim attenuata utrinque viridia ac tamen glandulis stipitatis fariniferis minutis conspersa supra areolatim sulcata subtus venatione prominula intricatim reticulata venis primariis a costa media albida arcuatim acute ascendentibus. Scapus teres ad 30 cm. altus validus dense albofarinosus umbellam capituliformem globosam multifloram gerens; bracteae albo-farinosae ligulatae acutae integrae ad 1.2 cm. longae ad 2 mm. latae floribus juvenilibus longiores calycem sub anthesi subaequantes, exteriores basi pulvinatim incrassatae recurvatae; pedicelli sub anthesi 2 mm. longi anthopodio obconico abstricto terminati decurvati. Calyx albo-farinosus (tubo intus excepto) ad 6.5 mm. longus ultra medium fissus tubo breviter tubuloso 5-angulato, lobis ligulatis acutis inaequalibus adpressis apice incurvis saepe

purpurascentibus. Corollae supra calycem extus albo-farinosae limbus infundibuliformis disco atropurpureo lobisque amethystino-violaceis, tubus extus rubescens ad 1 cm. longus subangulatus intus supra stamina sub-viridis transverse rugosus rugis supremis flavidis strumosis ad faucem pseudoannulatim cinctus infra stamina membranaceus, limbi discus 2 mm. latus, lobi oblongi vel subquadrati ad 4 mm. longi ad 4.5 mm. lati praemorsi vel subtruncati emarginati. Stamina floris longistyli filamentis pallidis basim tubi corollini versus inserta brevistyli ad faucem antherarum apicibus ab annulo 3 mm. remotis inserta ; antherae luteae connectivo purpureo. Ovarium depresso-globosum ; stylus longus flavido-viridis calyce brevior ; stigma rubrum capitatum lobulatum. Capsula globosa calycis tubo inclusa supra incrassata valvis 5 ab apice dehiscens.

Species ex affinitate *P. sphaerocephalae*, Balf. fil. et *P. crispatae*, Balf. fil. et W. W. Sm. foliis haud erosis, bracteis ligulatis integris distincta.

Atuntsu. 11,000 ft. F. Kingdon Ward, No. 92 A. 1911.

Amongst plants in cultivation the species which *P. pseudocapitata* resembles most is the Indian *P. crispata*, Balf. fil. et W. W. Sm. When in flower the two plants are easily separated by their inflorescence, which in *P. pseudocapitata* is globose and bears narrow funnel-shaped flowers, whilst in *P. crispata* the inflorescence forms a broad disk and the flowers develop an open limb of a more truly blue tinting. By foliage the distinction is more difficult yet is definite. *P. pseudocapitata* has not erose-margined leaves with lobation and crisped teeth as in *P. crispata*.

Ward's plant is a useful garden plant. It comes into flower about the mid-flowering period of the Capitata aggregate.

From *P. sphaerocephala*, Balf. fil. it is separated by its smaller flowers and uncut bracts.

1296 **Primula pulvinata,** Balf. fil. et Ward. (Suffruticosa.)

Suffruticosa parva pulvinata efarinosa glandulis viscidis capitatis translucentibus longe stipitatis omnino molliter vestita redolens. Rhizoma lignosum multo ramosum annorum praeteritorum foliorum vestigiis siccis ferrugineis obtectum. Folia in vernatione revoluta longe petiolata ad 6 cm. longa arcuatim patentia ; lamina lanceolata ad 4 cm. longa ad 8 mm. lata apice obtusa margine crenato-undulata lobulis inter crenas obtusis brevibus distantibus adscendentibus basi cuneata supra intense viridis costa media venisque primariis sulcatis subbullata infra pallidior costa media venisque primariis elevatis subreticulata utrinque glanduloso-viscida ; petiolus laminam subaequans pallide viridis vel albidus glanduloso-viscidus supra

concavus subtus convexus basi expansus vix vaginans. Scapus brevis ad 1.5 cm. longus erubescens cum bracteis pedicellisque dense glanduloso-puberulus umbellam 2–3-floram gerens; bracteae circ. 8 mm. longae virides a basi circ. 1 mm. lata acuminatae pedicellos aequantes vel eis breviores; pedicelli rubri 1–2 cm. longi fragiles; anthopodium obconoideum incrassatum magnum. Flores inter folia immersi. Calyx viridis circ. 8 mm. longus ultra medium fissus tubo poculiformi-tubuloso extus glanduloso viscido, lobis a basi lanceolatis acutis subpatentibus trinerviis integris. Corollae aureae fl. brevistyli tubus circ. 1 cm. longus cylindricus pallidior supra stamina ampliatus extus glanduloso-puberulus intus conspicue transverse rugosus ad os pentagonum subconstrictus annulatus annulo 10-lobato lobulis duobus strumosis ad basin cujusque petali oppositis, limbi discus circ. 1 mm. latus intensius coloratus glandulosus, lobi obcordati circ. 1 cm. longi 8 mm. lati apice emarginati recurvati subtus subalbidi ibique dense glanduloso-pubescentes. Stamina filamentis conspicuis crassiusculis antheras subaequantibus in flore brevistylo os tubi corollini versus antherarum apicibus vix exsertis inserta. Ovarium viride globosum; stylus brevis calyce multo brevior; stigma capitatum.

Species *P. pseudobracteatae*, Petitm. affinis sed efarinosa haud scabrida et ad haec umbellis 2–3-floris, calyce longiore ultra medium fisso, corolla calycem triente superante recedit.

N.W. Yunnan. On precipices above a glacier two days west of Atuntsu. Alt. 11,000 ft. F. Kingdon Ward. June 1913. Growing in big tufts.

In 1913 Mr. Kingdon Ward sent to me a small dried specimen of this plant which in many ways agreed with the impression I had been able to form from Petitmengin's description of the plant named *P. pseudobracteata*, Petitm., and I included it provisionally under this name. The living plants which we now have do not confirm my earlier impression. Petitmengin speaks of his species as having the leaves white mealy below when young at least. There is no sign of this in Ward's plant, and the glandular hairs are not of the kind that produce meal. They have relatively long stalks, and the globose translucent head is coated with sticky glandular secretion. Petitmengin indeed says of *P. pseudobracteata* that it is covered with hairs which are in part glandular scabrid, but there is no suggestion of scabridity in Ward's plant. Other characters of difference between *P. pulvinata* and *P. pseudobracteata* are its calyx, which is larger, more deeply cut, and with lobes entire showing no sign of incision, its corolla tube not so much longer than the calyx, and then in the corolla itself there is the distinctive creamy white and giandular under surface of the lobes so conspicuous a feature

that had it been present in *P. pseudobracteata* it must have been recorded.

From seeds sent by Kingdon Ward to Bees, Ltd., and of which a portion was presented to us, plants have been raised and flowered both at Liverpool and in Edinburgh—the first flowering in 1915. The plant is a dainty cushion plant and, covered with its relatively large yellow flowers resting on the foliage cushion, is a pretty sight. We have not yet tried it in the open over a winter. Its aspect seems to tell that it wants the same treatment as *P. Forrestii*, Balf. fil.

Primula radicata, Balf. fil. et W. W. Sm. (Rosea.)

Caespitosa nana polyrhiza farinosa epilosa. Folia ad 2 cm. longa ad 1 cm. lata ; lamina coriacea elliptica vel oblonga apice rotundata margine remote et grosse dentata dentibus hydathodo prominulo terminatis utrinque glanduloso-foveolata supra sparsim subtus dense albo-farinosa costa media crassa prominente percursa venis primariis patulis immersis basi a petiolo constricta; petiolus laminam aequans vel ea brevior late membranaceo-alatus latitudine uniformis. Scapus nullus. Umbella sessilis 4–5-flora inter folia immersa ; bracteae involucrantes vaginantes exteriores majores ad 5 mm. longae a basi lata amplexicauli acuminatae carinatae basi in sacculum gibbosum parvum rotundatum productae ; pedicelli validi bracteas aequantes ; anthopodium obconoideum. Calyx crassiusculus 5 mm. longus campanulatus costatus rubro-punctatus intus sparsim albo-farinosus ad trientem fissus lobis triangularibus acutis purpureis. Corollae roseae (?) crassiusculae tubus ad 1 cm. longus anguste cylindricus supra stamina subito ampliatus extus glaber intus infra stamina plus minusve puberulus in parte ampliata velutino-puberulus forsan farinosus ad os constrictus et annulo intensius colorato instructus, limbi discus angustus vix 1 mm. latus, lobi coriacei aperti ad 3 mm. longi basi quadrati vel rectangulares apice in lobulos 2 rectangulares subtruncatos divergentes saepe emarginatos vel retusos fissi. Stamina filamentis prominulis antheris magnis 2 mm. longis in flore brevistylo supra medium tubi corollini inserta antherarum apicibus 1.5 mm. ab annulo remotis. Ovarium ovoideum ; stylus brevis calyce multo brevior ; stigma ovoideum.

P. roseae, Royle affinis foliis coriaceis farinosis, umbella exscapa notisque aliis differt.

A very distinct species which I have seen only in the few specimens in the Calcutta Herbarium, collected by Capt. Younghusband in 1894 in Chitral. It is placed as a variety of *P. rosea*, Royle in the Calcutta Herbarium, and I assume from that the flower colour is rose, and there is nothing in the dried form to

contradict the assumption. The material for examination is small, and I am unable to determine with certainty whether the corolla throat is really densely farinose or only glandular puberulous. The whole surface is covered as with velvet pile, and in the flower I examined the cavity was filled with sand particles which adhered more or less firmly to the surface. The annulus constricting the corolla tube is evidently darker than the rest of the corolla.

1775 **Primula redolens,** Balf. fil. et Ward. (Suffruticosa.)

Suffruticosa fragrans ubique pilis albis glandulosis vestita rhizomate lignoso multicipite forsan in senectute foliorum vestigiis siccis dense obtecto. Folia petiolata sub anthesi ad 12 cm. longa ; lamina oblonga ad 8 cm. longa ad 3 cm. lata obtusa margine grosse crenulata basi in petiolum fere aequilongum vix alatum supra canaliculatum evaginatum breviter cuneatim attenuata utrinque pilis albidis glanduloso-pilosa efarinosa supra bullata subtus pallidiore et favoso-reticulata costa media prominula. Scapus robustus ad 12 cm. longus umbellam ad 12-floram gerens dense albido-glanduloso-pilosus ; bracteae ad 1.3 cm. longae basi ad 5 mm. latae anguste ovato-acuminatae foliaceae plurinerviae farina alba inter pilos albidos glandulosos plus minusve vestitae ; pedicelli ad 2 cm. longi erecti glanduloso-pilosi virides ; anthopodium magnum obconoideum. Calyx poculiformis ad 8 mm. longus extus glanduloso-pilosus et albo-farinosus intus plus minusve albo-farinosus ultra trientem fissus lobis ovatis trinerviis subacutis. Corollae floris brevistyli albidae vel pallide violaceae tubus infra stamina cylindricus supra paullo ampliatus extus lacteo-albus glanduloso-pilosus et albo-farinosus intus infra stamina transverse rugosus pallide luteus supra erugosus viridi-luteus exannulatus, limbi plani discus angustissimus, lobi imbricati ad 1 cm. longi obovati bifidi subtus albo-farinosi. Stamina floris brevistyli filamentis luteis distinctis infra medium tubi corollini inserta antherarum apicibus circ. 2 mm. ab ore remotis. Ovarium globosum ; stylus brevis pallide viridis tubo corollino vix longior ; stigma subcapitatum lobulatum.

Species ex affinitate *P. Forrestii*, Balf. fil. et *P. rufa*, Balf. fil. floribus albidis vel pallide violaceis facile distinguenda.

Yunnan. F. Kingdon Ward.

This plant, of which no dried specimens are in Ward's collection, was raised in the Royal Botanic Garden, Edinburgh, from seeds sent home by him in 1911, and presented by Mr. Bulley. It may be best described as a white or violet-flowered *P. Forrestii*, Balf. fil. It is hardier than *P. Forrestii* and is a more robust grower. Very fragrant.

Primula Reginella, Balf. fil. (Auriculata ?)

Pusilla tenuis efarinosa epilosa paucifolia foliis longe petiolatis. Folia circ. 3 cm. longa; lamina crassiuscula circ. 1 cm. longa 6 mm. lata oblonga vel elliptica vel subrhomboidea obtusa margine integra basi cuneatim vel plus minusve abrupte in petiolum lamina duplo longiorem alatum infra membranaceum longe cylindrico-vaginantem attenuata utrinque concolor pilis capitatis minutissimis sparsim obtecta. Scapus folia subaequans circ. 2 cm. longus tenuis strictus pallide viridis glaber umbellam ad 6-floram gerens; bracteae virides circ. 9 mm. longae vix 1 mm. latae lineares acutae basi pallidae submembranaceae plus minusve longe vaginantes circum pedicellos cucullatae haud productae sed subinflatae; pedicelli subfiliformes stricti virides circ. 1.5 cm. longi ultra folia projecti; anthopodium ad 1.5 mm. longum obconoideum subinflatum. Calyx circ. 5 mm. longus tubulosus extus obscure pulverulentus tubo extus sepalorum costis obscure angulato viridi et minute purpureo-maculato intervallis subpergamentaceis pallidioribus ultra trientem fisso, lobis oblongis vel oblongo-triangularibus obtusis vel subacutis viridibus purpureo-maculatis. Corollae pallide roseae tubus calycem subaequans vel eo longior extus viridi-luteus glaber cylindricus supra stamina paullo ampliatus intus infra stamina laevis supra transverse aurantiaco-rugosus ad faucem annulo subregulari crenulato aurantiaco cinctus, limbi plani postea reflexi discus circ. 1 mm. latus intus aurantiacus extus purpureus, lobi aperti obovati vel cuneati circ. 5 mm. longi ad trientem in segmenta elliptica bipartiti. Stamina filamentis brevissimis antheris parvis circ. 0.5 mm. longis luteis connectivo cinereo in flore longistylo sub os tubi corollini (antherarum apicibus circ. 1 mm. ab annulo remotis calycem aequantibus) inserta in flore brevistylo ad os inserta apicibus ultra annulum exsertis. Ovarium ovoideum vel subturbinatum infra viride tenue superne stylopodio incrassato 5-areolato coronatum; stylus longus paullo exsertus brevis calycem subaequans; stigma parvum ovoideum. Capsula circ. 6 mm. longa calyce adpresso cincta cylindrica apice valvis 5 nunc bipartitis brevibus incrassatis dehiscens.

Species aspectu *P. tibeticae,* Watt et *P. pumilionis,* Maxim. ab ambabus bracteis linearibus basi haud productis facile distinguenda.

W. Szechwan. Tungnglo. Soulié. No. 879. 1893. In Herb. Kew.

W. China. Grasslands, 11,000–13,500 ft. Flowers bright mauve. Wilson. No. 4035. May 1904. In Herb. Kew.

Kansu. Ta-Tung Alps. Highest alpine turf from 14,000–15,000 ft. Bright pink. Scentless and very charming, growing

in small clusters. Farrer and Purdom. F. 561. Primula No. 30. June–July 1915.

Mr. Farrer's beautifully laid out and pressed specimens from Kansu come as a welcome confirmation of my diagnosis from the specimens cited above in the Kew Herbarium of this new species. Soulié's specimen No. 879 (there are three sheets) carry the Paris name *P. tibetica*, Watt. Wilson's specimens are named *P. pumilio*, Maxim. All have been referred to *P. pumilio*. But the species is separable from both *P. tibetica* and *P. pumilio* by many characters, and if I name here that of the bracts it is because it can be appreciated at a glance. In Watt's and Maximowicz's species these are characteristically saccate at the base and are moreover relatively broad and short. In *P. Reginella* there is no saccation; the anthopodium is large as in all this series and the surface layers are somewhat inflated, but there is never a sign of any prolongation downwards. In addition, in *P. Reginella* the bracts themselves are long linear nearly equalling in length the pedicels. In *P. pumilio* the bracts are quite short, often as broad as long. In *P. tibetica* they are never linear.

I had drawn up a description of the species under a name of my own coinage awaiting publication when Mr. Farrer's specimens came along with the happy suggestion of a name, and I am pleased to adopt it.

1349 **Primula Roylei,** Balf. fil. et W. W. Sm. (Sonchifolia ?)

P. obtusifolia, Royle var. *Roylei*, Hook. fil. in Fl. Brit. Ind. iii (1862), 489; Watt in Journ. Linn. Soc. xx (1884), 8 (ex parte).

P. obtusifolia, Royle in Bot. Mag. (1887), t. 6956; Pax in Engler, Monogr. (1905), 118 (ex parte).

Epilosa farinosa rhizomate parvo radicibus crassis suffulto ad collum squamis plurimis imbricatis persistentibus firmis erectis ovatis acutis 2.5–8 cm. longis circ. 2.5 cm. latis dense luteo-farinosis circumcincta. Folia ad 12 cm. longa sub fructu accrescentia in rosulam congesta; lamina coriacea oblonga vel fusiformis nonnunquam subspathulata ad 9 cm. longa ad 4 cm. lata apice obtusa margine eroso-denticulata deorsum in petiolum brevem latum ligulatum plus minusve membranaceum basi late vaginantem lamina multo breviorem attenuata infra pallidior utrinque granulosa glandulis brevissime stipitatis et capitatis fariniferis (in speciminibus siccis farina vix manifesta est et glandulae quasi puncta rubra sese ostendunt) praedita costa media lata elevata utrinque conspicua venisque primariis occultis percursa. Scapus plerumque validus plus minusve luteo-farinosus ad 20 cm. longus (sub fructu multo elongatus) umbellam

terminalem ad 25-floram gerens; bracteae submembranaceae plurimae adpressae ad 1 cm. longae a basi subvaginata gradatim acuminatim attenuatae glandulis fariniferis vestitae; pedicelli tenues ad 2.5 cm. longi bracteas longe superantes nigrescentes luteo-farinosi in anthopodium conspicuum expansi infra fructum leviter incrassati. Calyx brunneus vel nigrescens coriaceus late campanulatus ad 9 mm. longus extus intusque plerumque luteo-farinosus ultra medium fissus tubo angulato lobis oblongis obtusis venulis nigrescentibus percursis. Corollae purpureae cum oculo atro-purpureo et annulo 10-lobato farinoso luteo tubus fl. brevistyli circ. 1.3 cm. longus longistyli circ. 1.1 cm. longus, infundibularis supra stamina ampliatus extus glandulis fariniferis conspersus intus infra stamina transverse rugosus supra puberulus, limbi subconcavi discus circ. 4 mm. latus puberulus, lobi patentes imbricati magni 1.3 cm. lati et longi obcordati vel subrotundati velutini apice retusi vel subpraemorsi. Stamina filamentis conspicuis late insertis et pulvinis interstaminalibus conjunctis antheris magnis circ. 3 mm. longis in fl. brevistylo ultra annulum semi-exsertis in longistylo calycem excedentibus. Ovarium ovoideum apice conoideum et stylopodium inconspicuum formans; stylus brevis validus calyce brevior stigmate discoideo, longus exsertus stigmate ovoideo. Capsula discoidea circ. 5 mm. lata vertice convexa in calycis tubo cupuliformi vix crustaceo lobis patentibus inclusa apicem pedicelli leviter incrassati stricti divaricati coronans irregulariter operculatim dehiscens. Semina irregulariter angulata cuboidea brunnea spongiose areolata circ. 2 mm. diam. columnam placentalem breviter et tenuiter crustaceo-stipitatam insternentia et ab ea gradatim cadentia.

Species *P. Gammieanae*, King persimilis sed squamis latis farinosis foliorum rosulam obtegentibus, foliis vix petiolatis, calyce fructibusque seminibusque minoribus valde diversa. Ab *P. obtusifolia*, Royle longe distans fructu operculato nec septicido distincta.

Sikkim. Sandakphu to Yakalungma, 10,000–12,000 ft. Watt. No. 5376. 30th May 1881. In Herb. Edin. et Kew.

Sikkim. Sandakphu, 11,500 ft. 30th May 1902. Lace, No. 2260. Sub nom. *P. Stuartii*, Wall. var. *purpurea*. In Herb. Calc.

Sikkim. Megu, near Nepal frontier, 13,000 ft. Ribu et Rhomoo. 15th June 1912. In Herb. Edin.

Sikkim. Sandakphu, 12,000 ft. Cave. Flowers violet. 30th May 1913. In Herb. Edin. Very typical.

Sikkim. Jongri, 14,000 ft. Rhomoo. No. 928. Flowers dark purple. 12th Aug. 1913. In Herb. Edin.

Sikkim. Tari, 13,000 ft. Cave. 29th May 1914. In Herb. Edin.

Nepal. Soon-soon-nangi, nr. Kanglanamo. King's Collector. June 1887. In Herb. Calc. Very typical.

Var. **acaulescens,** Balf. fil. et W. W. Sm.

Forma escaposa. Flores longe pedicellati pedicellis filiformibus folia superantibus ad 12 cm. longis ex axillis foliorum quasi singillatim vel fasciculatim orientibus.

Sikkim. Sandakphu to Yakalungma, 10,000–12,000 ft. Watt. No. 5376. 20th May 1881. In Herb. Edin. et Kew. Clarke. No. 34,973. 5th June 1884. Sub nom. *P. petiolaris,* Wall.

This purple-flowered species has been confused with *P. obtusifolia,* Royle and is one of the plants included by Hooker in his *P. obtusifolia,* Royle var. *Roylei.* Pax does not recognise Hooker and Watt's var. *Roylei* and sinks it in *P. obtusifolia.* But *P. obtusifolia,* Royle * is a Western Himalayan species; it does not occur in Sikkim, and is a very different plant from all Sikkim species; it belongs to the Nivalis Section. *P. Roylei* is one of a series of Eastern Nepal, Sikkim, Tibet, and Bhutan plants which find their alliance in the Chinese species of the Sonchifolia Section and in the Petiolaris Section. The fruit characters separate them widely from *P. obtusifolia.* Possibly we may have to unite in one section Sonchifolia and Petiolaris, but at the moment I cannot discuss this question, as material for a decision is still lacking. *P. Roylei* is only one of several species that have been confused with *P. obtusifolia.* Others are *P. Gammieana,* King, *P. Griffithii,* Watt, *P. macrophylla,* Don, *P. obliqua,* W. W. Sm., *P. purpurea,* Royle, *P. spathulata,* Royle, *P. Stuarti,* Wall., *P. Tanneri,* King. It has been in cultivation for many years under the name *P. obtusifolia,* and is the plant figured under that name in the Bot. Mag. (1887), t. 6956. In the Report of the Primula Conference, 1913, there is a figure of it as cultivated under that name at Edinburgh. My remarks upon *P. obtusifolia* as a garden plant quoted by Sir George Watt † refer to *P. Roylei.*

P. Roylei is spread over West Sikkim and the eastern boundary of Nepal. It affects altitudes of 12,000–14,000 ft., and, as the list of localities given above shows, I have seen specimens collected at various stations from Sandakphu in the south to Kanglanamo and Jongri in the north. Sir George Watt writes of it in his field notes as growing singly on damp grass-covered hills, covering miles of country with its pale purple flowers with yellow annulus. He also says that its scent is "oppressive metallic said to give headache," contrasting with the yellow-flowered *P. obliqua,* W. W. Sm. of which "the flowers are much more pleasantly scented." From Sir George

* Royle Illustr. Bot. Himal. (1839), 311, t. 77. f. 1.
† Watt, Observations on Indian Primulas in Journ. R.H.S. xxix (1904), 1316.

Watt's field notes I may quote further. The plant has a "stem short erect surrounded by broad scales 1 inch in diameter, and 1½ to 3 inches long, coated with yellow farina. The leaves are sessile oblong spathulate, broadly speaking, or ovate oblong sheathing subacute erose 3–4 inches long, never more than half the length of the peduncle. Peduncle mealy at extremity and generally present but, as in the English primrose, often wanting, the pedicels being then very long. Bracts forming a whorl not spurred ovate acuminate closely adpressed to pedicels and about half the length. Calyx large wide loose dark brown prominently angled half cleft into 5 linear subobtuse sepals mealy in sinus. Pedicels mealy at union with calyx. Flowers large, 1 inch in diameter and tube ¾ inch, pink purple with dark purple ring around the yellow mouth. Corolla tube inflated upwards twice the length of calyx; limb flat rotate very broad oblong obtuse very slightly emarginate throat constricted by a yellow annulus of from 5–10 irregular though prominent teeth less prominent in the short-styled forms. Ovary globose completely hid within the loose calyx."

It is fortunate that we have this comprehensive field note by Sir George Watt, recording his observation of two forms which the plant exhibits—a caulescent and an acaulescent—for isolated dried specimens might otherwise have been misleading. The scapeless state—which may have the name var. *acaulescens*—is one of the suppression of the scape accompanied by elongation of the pedicels and also of the subtending leaves, bringing about the condition which occurs in *P. acaulis*, in contrast with that of *P. elatior* or with that of the caulescent forms of *P. acaulis* which correspond with the normal state of *P. Roylei*.

In its typical state *P. Roylei* is recognised from its near ally *P. Gammieana* of Eastern Sikkim and Tibet by the broad persistent farinose leaf-scales beneath the foliage rosette, by the absence of long petioles in the flowering stage, by thicker leathery leaves, by the shorter flower pedicels which do not thicken so much under the fruit, by the less woody calyx under the fruit and its longer pointed lobes, by the narrower hardly woody placental stipe, and by the smaller seeds.

1883 **Primula strumosa,** Balf. fil. et Cooper. (Elongata.)

Planta epilosa rhizomate parvo foliisque plus minusve erectis vaginis longis suffultis. Folia petiolata coriacea vel subcarnosula longe petiolata ad 10 cm. longa; lamina oblanceolata vel sublanceolata ad 4.5 cm. longa 2 cm. lata deorsum in petiolum vaginantem longum erectum membranaceo-alatum erubescentem sensim attenuata apice obtusa vel rotundata margine leviter subcartilaginea irregulariter crenato-denticulata utrinque

glandulis plus minusve pulverulenta efarinosa supra laevis atro-purpurea vix venulosa subtus pallidior costa media elevata caeteroquin obscure reticulato-venulosa. Scapus ad 18 cm. altus validus infra glandulis fariniferis conspersus nunc erubescens apicem versus atro-purpureus et aureo-farinosus umbellam ad 8-floram floribus nutantibus gerens; bracteae atro-purpureae aureo-farinosae a basi lata lanceolatae acutae cucullatae carinatae basi extus pulvinatim incrassatae; pedicelli ad 1 cm. longi atro-purpurei aureo-farinosi nutantes; anthopodium turbinatum magnum ad 2 mm. longum. Calyx crasse coriaceus campanulatus circ. 5 mm. longus atro-purpureus extus intusque aureo-farinosus ad medium fissus tubo angulato lobis ovatis vel oblongis obtusis. Corollae aureae aurantiaco-oculatae tubus in flore longistylo circ. 1.2 cm. longus infra cylindricus angustus supra stamina ampliatus extus plus minusve aureo-farinosus intus erugulosus annulatus annulo aurantiaco lobulato-crenulato, limbi discus circ. 2 mm. latus dense pubescens, lobi subrotundati vel oblongi circ. 8 mm. longi crenulati. Stamina in flore longistylo basim tubi corollini versus inserta ultra calycem prolata filamentis validis deorsum expansis strumis corollinis inter se conjunctis, antheris ad 2 mm. longis luteis connectivo fulvo. Ovarium globosum; stylus longus tenuis corollae tubo brevior; stigma cylindricum angustum ab annulo 2.5 mm. remotum.

Species *P. elongatae*, Watt affinis sed foliis subtus efarinosis, calycis lobis brevibus obtusis, corollae tubo breviore, staminibus strumoso-conjunctis diversa.

Bhutan. Champa Pumthang. Alt. 14,000 ft. Flowers yellow, golden eye. Inflorescence yellow-mealy. Open turf among boulders. R. E. Cooper. No. 4072. 24th June 1915.

None of the writers on Indian Primulas has made clear the character limits of *P. elongata*, Watt, a species which collectors have mixed up with *P. sikkimensis*, Hook., with *P. Stuartii*, Wall., and with *P. obtusifolia*, Royle. I shall give elsewhere a critical account of *P. elongata*. Here I need only say that it is separated by abundant characters from the three species with which it has been confused, and that we know of it now from Bhutan as well as from Sikkim. The plant I am describing here recalls *P. elongata* in habit and size and also in colour of flower but wants the mealiness—very characteristic in form—of the under surface of the leaf; the calyx is much smaller and the lobes are obtuse and have a different venation; and the stamens have at their base swollen cushions of the corolla joining them and forming a sort of second annulus.

Primula vernicosa, F. K. Ward. (Petiolaris.)

Pusilla efarinosa foliis vix petiolatis rosulatis glandulis clavatis dense obsitis secretione viscida saepe vernicosis, rosula poculiformi basi squamis parvis submembranaceis circumcincta. Folia crassiuscula squamas gradatim sequentia ad 3 cm. longa ad 1.5 cm. lata oblanceolata vel oblonga apice obtusa margine quasi suberosa dentibus acuminatis inaequalibus recurvis hydathodo terminatis glanduloso-ciliolatis circumcincta basi integra deorsum paullo attenuata late inserta evaginata utrinque concoloria costa media lata pallidiore supra plana subtus elevata venis primariis penninervatim adscendentibus percursa. Scapus brevissimus crassus saepe vix 3 mm. longus sub fructu ad 6 cm. elongatus viridis umbellam 2–3-floram inter folia immersam gerens ; bracteae 3–4 a basi subamplexicauli liguliformes apice acuminatae circ. 7 mm. longae 1.25 mm. latae virides utrinque et margine glandulis elevatis viscidis obtectae ; pedicelli sub anthopodio fere nulli circ. 2 mm. longi crassi virides glandulosi in anthopodium magnum circ. 3 mm. longum et latum expansi. Calyx ventricoso-poculiformis crassus viridis circ. 1 cm. longus (sub fructu auctus) extus dense viscide glandulosus intus glandulis longioribus conspersus lobis circ. 3.5 mm. longis imbricatis subrotundatis concavis vertice 3–5-dentatis (dentibus subpatentibus triangularibus hydathodo-terminatis glanduloso-ciliatis) venulis 7–9 translucentibus flabellatim divaricatis percursis. Corollae albae ubique plus minusve glandulosae tubus basi cylindricus sursum ventricosus ad os constrictus calyce inclusus et eo brevior subcarnosulus annulatus annulo albo dense glanduloso 10-lobo in faucem protruso, limbi discus concavus circ. 1 mm. latus glandulosus, lobi circ. 5 mm. longi 2.5 mm. lati oblongi basi subconstricti apice obtusi vel subtruncati. Stamina fl. longistyli filamentis conspicuis circ. 1 mm. longis deorsum expansis prope basim regionis corollinae ventricosae inserta antheris linearibus apiculatis circ. 1.25 mm. longis. Ovarium globosum viride ; stylus longus tubum corollinum aequans ; stigma ovoideum bilobum. Capsula convexa discoidea circ. 8 mm. lata quoad dimidium inferius tubo calycis membranaceo inclusa supra subcrustacea pseudo-operculata irregulariter rupta ; placenta late discoidea stipite crasso. Semina spadicea subcuboidea circ. 1 mm. diam. ; testa vesiculoso-tuberculata.

Species *P. taliensi*, G. Forrest affinis sed minor, pilorum inopia floribusque inter folia immersis valde diversa.

Yunnan. Mekong-Salween Divide, W. slope. 12,000 ft. F. Kingdon Ward. No. 94. June 1911. "Growing in open damp situations in Abies forest. The immense root system and closely packed leaves may be due to the coldness of the soil on this shaded north slope where snow was still lying."

Tibeto-Chinese frontier. Ka-gwr-pw. Doker la, 14,000 ft. F. Kingdon Ward. No. 794. 18th July 1913. Mossy banks. Rhododendron forest.

A distinct species resembling in growth *P. taliensis*, Forrest and marked out by its glands and calyx. The features of these organs indicate the place of the species in the Petiolaris Section. The toothing at the summit of the calycine lobes and the conspicuous radiating venation of the lobes are remarkable.

The species is in cultivation from seeds sent by Kingdon Ward to Bees, Ltd. Of plants raised from these seeds, some of which were presented to the Royal Botanic Garden, Edinburgh, by Mr. A. K. Bulley, several have flowered. From such a first flowering experience tells me to be cautious in estimating the horticultural value of the Primulas. Our plants have produced small short-stalked clusters with successional white flowers which nestle amongst the green leaves. The plant looks as if it would be a good grower, and if it covers itself with many trusses it should be as worthy of a place in gardens as some of the cushion Androsaces.

Primula xanthopa, Balf. fil. et Cooper. (Yunnanensis.)

Caespitosa aureo-farinosa epilosa rhizomate tenui elongato circ. 1 mm. diam. alabastra axillaria plurima et radices albidas profusas emittente infra foliorum praeteritorum vestigiis siccis dense obtecto. Folia membranacea petiolata ad 6 cm. longa; lamina plana oblonga vel subelliptica ad 3 cm. longa ad 1.5 cm. lata apice rotundata grosse serratim inciso-dentata dentibus acuminatis apiculatis basi integra in petiolum cuneatim attenuata supra atro-viridis sed tamen glandulis farinae potentibus conspersa subtus dense aureo-farinosa costa media venisque primariis acute adscendentibus utrinque subprominulis; petiolus lamina longior ad 5 cm. longus tenuis angustissime alatus basi expansus dense aureo-farinosus. Scapus delicatus ad 10 cm. longus plus minusve aureo-farinosus flores 1–3 umbellatim gerens; bracteae 2–4 cyclicae inaequales senior maxima ad 6 mm. longa vix 2 mm. lata ligulata acutiuscula cucullata integra nunc minute denticulata uninervia plus minusve aureo-farinosa juniores minores; pedicelli filiformes ad 1 cm. longi aureo-farinosi stricti plus minusve erecti; anthopodium obconoideum parvum. Calyx circ. 6 mm. longus aperte campanulatus viridis extus intusque aureo-farinosus ultra medium fissus tubo 5-costato lobis oblongis acutis uninerviis patentibus sinuatis. Corollae purpureae aureo-oculatae tenuiter membranaceae tubus cylindricus supra stamina paulo ampliatus in flore brevistylo circ. 1 cm. longus in longistylo circ. 8 mm. epilosus efarinosus erugosus limbo pallidior, limbi plani discus circ. 2.5 mm. latus dense aureo-

farinosus, lobi ad 8 mm. longi obovati imbricati bifidi segmentis divaricatis. Stamina filamentis brevissimis subnullis antheris circ. 1 mm. longis in flore brevistylo ad faucem antheris fere exsertis in longistylo infra medium tubi corollini antheris calycem vix superantibus inserta. Ovarium ovoideum; stylus longus corollae tubum aequans brevis calycem aequans; stigma discoideum margine revolutum. Capsula calycem aequans inclusa oblonga circ. 5 mm. longa infra membranacea supra incrassata ab apice valvis 5 ad trientem dehiscens; placenta cylindrica circ. 2.5 mm. longa stipite tenui circ. 1 mm. longo. Semina fulva complanata elliptica circ. 0.75 mm. longa breviter vesiculoso-tuberculata.

Species Sectionis Yunnanensis foliis longe petiolatis et grosse inciso-dentatis, corollae disco aureo-farinoso facile recognoscenda.

Bhutan. Dong la, Lingtsi and Tashiyangsi Kurted. Alt. 12,000 ft. Flowers purple, petals sinuate, yellow eye. Growing on mossy stones under Abies forest. R. E. Cooper, No. 4393. 10th Aug. 1915.

Bhutan. East of Lingtsi Kurted. Alt. 12,000 ft. Flowers purple. Corolla lobes wavy. On mossy rocks under Abies forest. R. E. Cooper, No. 4977. Sept. 1915.

From the standpoint of geographical distribution a most interesting species. *P. xanthopa* is a characteristic member of the Section Yunnanensis of which *P. tenella*, King is the only species hitherto recognised outside China. Like other Bhutan species described in these pages it is a link between the Himalayan and West Chinese Floras. The plant resembles in its inflorescence *P. yunnanensis*, Franch. itself but is taller. The flat membranous leaves with deeply incised margins borne on long petioles distinguish the plant from all Chinese allies. It shows the characteristic decay of the leaves by gradual desiccation which we find in the Yunnanensis series associated with delicate rhizomes and stolons. This character makes them resent our outdoor winter climate. They seem to rot off at once if the old desiccating leaves are kept damp.

Fifteen of the forty species of Primula described in the preceding pages are the result of more critical examination in the light of recently acquired knowledge of the Primulas hitherto described from the East and West Himalaya; eight are Bhutanese, the outcome of R. E. Cooper's explorations; the others are Western Chinese gathered by Forrest, Kingdon Ward, Farrer and Purdom, and Maire, one only being the result of differential diagnosis in older Chinese collections. They by

no means exhaust the number of new species of which material for description is in our hands. Mr. Craib has recently completed an exhaustive study of the Section Petiolaris, and descriptions by him of eleven new species will appear shortly in these "Notes." Many of the species described here are in cultivation, and the following have flowered:—*P. aerinantha, anisodora, brevicula, cardiophylla, conica, crispa, crispata, helodoxa, lacteocapitata, Menziesiana, Mooreana, pseudocapitata, pulvinata, redolens, Reginella, Roylei, vernicosa.* Of those most recently introduced are:--*P. helodoxa* of the Candelabras with bright yellow flowers; *P. anisodora* of the same Section but too like an Auricula in flower for its own sake as a garden plant but with potentialities for crossing; *P. minor* and *P. brevicula* of the Pulchella series are neat dwarf plants and will be valuable in the garden when we learn how in our climate to save them from the collar rot which seems to attack more or less all species that have a Nivalis ancestry; *P. pulvinata* and *P. redolens* are, I fear, likely to be difficult in the open as is their relative *P. Forrestii*; of the three Muscarioids, *P. aerinantha, P. conica,* and *P. Menziesiana,* the last named is, I think, one of the most charming of its Section—a Section containing many delightful species which if treated as biennials well reward the care bestowed upon them; *P. Reginella* is like a miniature *P. tibetica.*

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JUNE 1916.

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EDINBURGH:
PRINTED UNDER THE AUTHORITY OF HIS MAJESTY'S STATIONERY OFFICE
By NEILL & CO., LIMITED,
At 212 Causewayside.

SOLD AT THE GARDEN,
And to be purchased, either directly or through any Bookseller, from
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NEW SPECIES OF RHODODENDRON.

BY

PROFESSOR BAYLEY BALFOUR, F.R.S.

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,, pycnocladum, Balf. f. et W. W. Sm., p. 267.
,, radinum, Balf. f. et W. W. Sm., p. 268.
,, ravum, Balf. f. et W. W. Sm., p. 270.
,, scintillans, Balf. f. et W. W. Sm., p. 271.
,, sino-Falconeri, Balf. f., p. 272.
,, sino-grande, Balf. f. et W. W. Sm., p. 274.
,, sphaeranthum, Balf. f. et W. W. Sm., p. 278.
,, tapetiforme, Balf. f. et Ward, p. 279.
,, telmateium, Balf. f. et W. W. Sm., p. 280.
,, theiochroum, Balf. f. et W. W. Sm., p. 282.

4073 **Rhododendron achroanthum,** Balf. f. et W. W. Sm.

Suffrutex ad 6 dm. altus parvifolius multiramosus. Ramuli stricti annui subvirgati ad 2 cm. longi annotini circ. 1.5 mm. diam. squamulis peltatis fuscis porriginosi seniores nigricantes mox decorticantes. Alabastrorum parvulorum oblongorum perulae paucae externae ovatae dense ferrugineo-lepidotae internae membranaceae oblongae obtusae lepidotae et ciliatae. Folia circ. 1.6 cm. longa petiolata; lamina coriacea crassa elliptica circ. 1.3 cm. longa circ. 8 mm. lata apice rotundata mucrone verruculoso parvulo margine leviter revoluta basi obtusa vel late cuneata supra opaco-viridis squamulis plurimis peltatis uniformibus haud ubique contiguis persistentibus ex umbone sucino-nitente institaque albida aedificatis induta costa media subsulcata vix conspicua subtus fusco-punctata squamis bicoloratis vix contiguis in strata duo aequaliter dispositis—strati superioris squamae longius stipitatae omnino fusco-brunneae umbone fere atro inferioris albidae vel intra institam annulatim sucino-nitentes—et ad areolas esquamatas papillis epidermicis subquadratis ceriferis vestita, costa media supra subsulcata vix conspicua subtus leviter prominula venis primariis utrinque occultis; petiolus circ. 2.5 mm. longus fusco-lepidotus. Flores in umbellam terminalem 3-floram dispositi; bracteae mox deciduae; pedicelli purpurei vix 2 mm. longi albido-lepidoti. Calyx atropurpureus circ. 4 mm. longus cupula circ. 0.5 mm. longa dense lepidota lobis oblongis vel ellipticis obtusis subaequalibus in medio dorso albo-lepidotis margine ciliatis. Corollae roseo-purpureae in sicco circ. 1.2 cm. longae tubus latus infundibuliformis circ. 5 mm. longus extus lepidotus intus breviter puberulus, lobi oblongi apice rotundati margine undulati extus albo-lepidoti. Stamina 5 (nunc 6) corolla longiora filamentis purpureis ad faucem corollae supra ovarium dense albovillosis. Ovarium ovoideum albido-pilosum et squamulis paucis

flavescentibus ad verticem praeditum ; stylus basi plus minusve pilosus purpureus corollam et stamina longe superans ; stigma discoideum atro-purpureum lobulatum.

Planta *Rh. rupicolo,* W. W. Sm. valde affinis forsanque illius microforma, corolla roseo-purpurea, staminibus plerumque 5, ovario ex toto albido-piloso diversa.

Yunnan. Mountains of the Chungtien plateau. Lat. 27° 30′ N. Alt. 12,000–13,000 ft. Shrub of 2 ft. Flowers dull deep magenta red. On open cliffs. G. Forrest. No. 12,581. July 1914.

This species is recognisable at sight from *Rh. rupicolum*, W. W. Sm., its close ally, by the paler colour of the flowers. In habit and foliage the two plants are alike. *Rh. achroanthum* has commonly 5 stamens—in only one flower, to be sure there are but few flowers altogether on the specimens, have I found 6—whilst *Rh. rupicolum* has 10. A difference in the ovaries of the two plants seemed at first to be most distinctive, but it may not have this importance. In *Rh. achroanthum* the ovary is grey in colour, being coated to the top with adpressed hairs ; only at the summit are to be found a few lepidote scales amongst the hairs. In *Rh. rupicolum* the ovary in the upper two-thirds is densely lepidote and only the basal part has adpressed hairs. The general aspect of the plants suggests *Rh. achroanthum* as being only a variety of *Rh. rupicolum*, and it may be so, but the flower colour is very characteristic.

See also p. 299.

4854 **Rhododendron acraium,** Balf. f. et W. W. Sm.

Fruticulus aromaticus parvifolius ad 1.5 m. altus breviter verticillatim ramosus. Ramuli annui breves ad 2 cm. longi hornotini dense citrino-lepidoti annotini 1.5 mm. diam. fulvi dense porriginosi seniores grisei nigro-tuberculati perulis persistentibus haud vestiti deinde decorticantes. Alabastrorum oblongorum acutorum vel obtusorum perulae mox deciduae externae coriaceae ovatae carinatae mucronulatae fulvae dorso lepidotae apicem versus subciliatae intus puberulae ad 4 mm. longae interiores subspathulatae submembranaceae flavidae carinatae apice rotundatae extus lepidotae intus puberulae margine hirsuto-ciliatae ad 8 mm. longae ad 2 mm. latae. Folia petiolata vix ad 2 cm. longa ; lamina crasse coriacea oblonga vel oblongo-elliptica circ. 1.5 cm. longa 8 mm. lata apice mucrone corneo recto terminata margine revoluta stipitum squamarumque vestigiis notata basi obtusa nec cordulata supra atro-viridis plana (costa media subsulcata caeteroquin venarum reti occulto) squamarum juvenilium vestigiis siccis subasperata (in juventute pagina margineque citrino-lepidotis esetulosis) infra fulva (in

juventute dense citrino-lepidota) porriginosa squamis peltatis inaequaliter stipitatis longioribus prolatis concoloribus umbone convexo plus minusve erubescente institaque late fimbriata praeditis (nunc paucis intensius coloratis punctiformibus) stratum superficiale supra squamas inferas plurimas incoloratas construentibus costa media vix apparente; petiolus ad 4 mm. longus furfuraceo-lepidotus. Flores albi in umbellam parvam capituliformem circ. 8-floram rhachi puberula et lepidota dispositi; bracteae steriles coriaceae late ovatae carinatae obtusae extus fulvae dorso plus minusve lepidotae margine minute ciliatae mucronulatae ad 5 mm. longae fertiles subramentaceae obovato-spathulatae circ. 7 mm. longae 3.5 mm. latae extus lepidotae margine apiceque ciliatae intus puberulae; prophylla membranacea subspathulata calyci aequilonga minute ciliata dorso lepidota circ. 6 mm. longa 1.5 mm. lata; pedicelli circ. 3 mm. longi lepidoti. Calyx circ. 4 mm. longus ad basim fissus lobis 5 inaequalibus oblongis obtusis vel subtruncatis erosis circ. 2 mm. latis nunc per paria connatis viridibus membranaceis dorso margineque lepidotis eciliatis vel rarissime ciliis paucis ad apicem praeditis intus glabris. Corollae tenuis 1.4 cm. longae obliquae tubus circ. 6 mm. longus extus glaber intus villosulus in limbum antice subrepandum postice suberectum sursum explanatus lobis 5 inaequalibus imbricatis rotundatis lobulato-crenulatis maximo circ. 6 mm. diam. Stamina inclusa circ. 5 mm. longa filamentis supra basin incrassatis pilosiusculis antheris oblongis circ. 1.5 mm. longis. Ovarium 5-lobatum circ. 1.5 mm. longum dense flavido-lepidotum; stylus vix 1 mm. longus clavatus stigmate lobato coronatus.

Species *Rh. cephalanthoidi*, Balf. f. et W. W. Sm. affinis sed foliis juvenilibus esetulosis, adultis minoribus, indumento subfoliari adulto compactiore, alabastrorum perulis brevioribus angustioribus, calycis lobis eciliatis vel ad apicem pilis paucis praeditis, corolla breviore tenui haud succulenta extus glabra recedens.

Yunnan. Mountains of the Chungtien plateau. Alt. 12,000–13,000 ft. Lat. 27° 35′ N. Shrub of 3–5 ft. Flowers white. Foliage aromatic. Open cliffs and amongst boulders. G. Forrest. No. 10,652. July 1913.

This Chungtien plant is a near ally of *Rh. cephalanthoides*, Balf. f. et W. W. Sm., yet is different. The more close set indumentum on the under-leaf surface is characteristic, and of other distinguishing features the smaller corolla of thin texture and glabrous outside is easily observed.

See also p. 315.

4855 **Rhododendron adenophorum,** Balf. f. et W. W. Sm.

Frutex ad 2.5 m. altus. Rami juveniles circ. 5 mm. diam. tomento lanato denso ochraceo glandulisque clavatis rubiginosis intermixtis obsiti vetustiores tomenti vestigiis griseis glandulisque verruculosis nigrescentibus notati. Alabastrorum oblongorum fulvidorum perulae glandulis plus minusve obtectae ciliatae viscidae gradatim ab externis parvis ovatis carinatis coriaceis breviter apiculatis per intermedias subrotundatas ad internas subspathulatas elongatas submembranaceas mutantes. Folia petiolata ad 13 cm. longa; lamina ad 10 cm. longa ad 4 cm. lata crasse coriacea lanceolata vel late lanceolata vel oblonga breviter acuminata margine paullo revoluta basi cordulata juvenilis utrinque flavido-lanato-tomentosa adulta supra atroviridis costae mediae sulco profundo tomento glandulisque obducto nervis primariis vix impressis caeteroquin reticulato-areolata areolis convexis glandulis stipitatis brevibus vel longioribus plus minusve vestita et nitenti-viscidula subtus cinnamomea vel fulva costa media prominula venis primariis occultis ubique pilorum longorum fasciatim a basi communi orientium ramosorum curvatorum strato uniformi haud scintillante crasso tomentoso lanato obtecta; petiolus circ. 2 cm. longus laminae more tomentosus glandulosusque. Flores plures umbellam laxam formantes; bracteae rufo-glanduloso-tomentosae; pedicelli ad 2 cm. longi dense glanduloso- et rufo-tomentosi sub fructu vix elongati. Calyx fere ad basim 5-lobatus lobis circ. 1 cm. longis 5 mm. latis oblongo-ellipticis submembranaceis glandulosis. Corolla rosea infundibuliformis circ. 3.5 cm. longa, tubo circ. 2.5 cm. longo intus glanduloso-puberulo, lobis 5 rotundatis emarginatis. Stamina 10 corolla breviora filamentis basim versus glandulosis. Ovarium glandulis clavatis dense obtectum viscidissimum; stylus corolla staminibusque vix longior in triente infimo glandulosus; stigma expansum lobatum. Capsula recta circ. 2 cm. longa 0.75 mm. lata nigra glandularum vestigiis verruculosa.

Species in serie *Rh. adenogyni,* Diels ramis petiolisque tomentoso-glandulosis, indumenti forma distinguenda.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 12,000 ft. Shrub of 4–6 ft. Flowers ? On rocks and stony pasture. G. Forrest. No. 10,429. July 1913.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 12,000 ft. Shrub of 4–8 ft. Flowers rose, with very few markings. Open situations on pasture and ledges of limestone cliffs. G. Forrest. No. 10,649. July 1913.

Yunnan. Mountains of the Chungtien plateau. Lat. 27° 30′ N. Alt. 12,000 ft. Shrub of 6–8 ft. Flowers rose. Open

situations on the margins of pine forests. G. Forrest. No. 12,713. July 1914.

Rh. adenogynum, Diels was the species first described of an aggregate of forms characterised by a thick buff-coloured or rufous uniform mat tomentum on the under side of the leaves, by a calyx with relatively large lobes—about 1 cm. long—and by an ovary and style bearing clavate glands. It may be taken as the central form. *Rh. adenophorum*, here described as a member of the aggregate, is distinguished by the viscidity of its buds, by the admixture of clavate red glands with tomentum on the young shoots and leaf petioles, by the long glands scattered over the upper leaf-surface, by the long-stalked glands upon the flower pedicels.

Rhododendron agapetum, Balf. f. et Ward.

Arbor parva ad 6 m. alta ramis contortis nudis. Ramuli annotini nigricantes setulis glandulosis et pilis stipitatis apice radiatim ramosis obtecti, vetustiores sordide cinerei esetulosi epilosi decorticantes. Folia petiolata ad 20 cm. longa ; lamina crasse coriacea oblonga ad 15 cm. longa ad 5.5 cm. lata apice obtusa tuberculata margine cartilaginea translucens esetulosa (in juventute dense setulosa) obscure undulata basi obtusa matura supra atro-viridis costa media sulcata caeteroquin laevis pilorum juvenilium vestigiis plus minusve conspersa subtus pallidior fulva pilis laxe ramosissimis dendriformibus primo ubique dense tomentosa deinde plus minusve glabrescens pilis floccosim deciduis costa media elevata erubescente venis primariis utrinsecus circ. 18 paullo elevatis erubescentibus caeteroquin laevis venis ultimis areolato-reticulata et pilorum delapsorum vestigiis minute punctulata ; petiolus circ. 3 cm. longus setulis pilisque plus minusve indutus glabrescens. Flores (circ. 10) racemoso-umbellati rhachi setulosa et pilosa ; bracteae mox deciduae ; pedicelli circ. 1.3 cm. longi dense breviterque glanduloso-setulosi. Calyx subobsoletus cupuliformis margine undulatus extus margineque dense breviter glanduloso-setulosus. Corolla coccinea circ. 4.5 cm. longa infundibuliformis extus intusque glabra sursum ampliata in lobos 5 orbiculares circ. 1.6 cm. diam. margine subcrenulatos divisa. Stamina 10 inaequalia majora tubo corollino paullo longiora filamentis deorsum complanatis dilatatis per dimidium inferum puberulis glandulosisque antheris nigro-purpureis circ. 3 mm. longis. Ovarium lobatum conoideum dense glanduloso-setulosum et pilis subdendriformibus praeditum circ. 7 mm. longum basi dense pubescens ; stylus staminibus paullo longior corollam subaequans basi glanduloso-setulosus et pilis paucis stipitatis

radiatim ramosis conspersus ad apicem expansus et stigmate lobato coronatus.

Species ad seriem *Rh. barbati*, Hook. f. pertinens foliis subtus pilis ramosis floccosim detersilibus praeditis, calyce subobsoleto, staminum filamentis puberulis, ovario styloque setuloso et piloso distinguenda.

E. Upper Burma. Hpimaw. Scraggy tree of 15–20 ft. On steep limestone cliffs in half shade of gully at 6000–7000 ft. Flowers crimson scarlet. F. Kingdon Ward. No. 1851. 31st July 1914.

A species of the Barbatum series, and from Kingdon Ward's description of the flower-colour a desirable one for cultivation. The plant finds its nearest ally apparently in *Rh. Smithii*, Nutt., a Bhutan species introduced by Mr. Booth which flowered in Britain in 1859 for the first time. This *Rh. Smithii* is quite a good species and is figured in the Bot. Magazine for 1859, t. 5120. It is one of the most frequent plants met with in gardens under the name *Rh. barbatum*, Wall. Mr. C. B. Clarke * placed *Rh. Smithii* as a variety of *Rh. barbatum*. That he went so far as to allow to the plant this varietal rank whilst sinking in *Rh. barbatum* the *Rh. lancifolium*, Hook. f. goes far to confirm its specific distinctness. Ward's plant has the characteristic dendriform hairs of the tomentum of the Barbatum series, and they fall from the leaf under-surface after the fashion of those in *Rh. Smithii*. To be sure the flower pedicels are much longer than in *Rh. Smithii* and the flowers are larger than in any Himalayan form of the series, but the plant is a good member of this alliance, and has the special interest from the standpoint of geographical distribution that it adds to the considerable body of evidence that is now accumulating which shows that the connection of the flora of East Upper Burma and South-West Yunnan with that of the Eastern Himalaya is closer than with the flora of North-West Yunnan and Szechwan. Of West Chinese species *Rh. habrotrichum*, Balf. f. et W. W. Sm. is the nearest known ally of *Rh. agapetum*.

4857 **Rhododendron argipeplum,** Balf. f. et Cooper.

Frutex circ. 2 m. altus. Ramuli hornotini pallide virides setis atro-purpureis ad 8 mm. longis eglandulosis intertextis glandulisque intermediis brevibus praediti vetustiores gradatim glabrescentes deinde cinerei decorticantes. Alabastrorum perulae fulvidae rotundatae vel late ovatae crustaceae saepe emarginatae circ. 8 mm. longae annos plures persistentes extus viscidae. Folia ad 14 cm. longa petiolata ; lamina oblonga ad 12 cm. longa ad 5.5 cm. lata apice abrupte acuminata tuberculo corneo terminata

* Clarke in Flor. Brit. Ind. iii (1882), 469.

margine cartilaginea pedibus setarum delapsarum asperata basi angustata cordulata lobis subrotundatis supra viridis (costa media venisque primariis utrinsecus circa 14 sulcatis setulis pilisque plus minusve indutis caeteroquin venarum reti occulto) pilorum vestigiis sparse conspersa subtus dense albido-tomentosa indumenti pilis longe tenuiter stipitatis ramos delicatissimos vesiculosos plurimos patentes intricatim intertextos ad apicem gerentibus et stratum folii paginam venarum reti elevato cinnamomeo notatam obtegens facientibus ; petiolus dense longeque strigillosus circ. 1.5 cm. longus. Flores ad 10 in umbellam racemose dispositi ; bracteae externae ovato-rotundatae crustaceae viscidae fertiles oblongo-spathulatae circ. 1.5 cm. longae extus et intus apicem versus sericeae ; prophylla linearia circ. 7 mm. longa sericea ; pedicelli erubescentes circ. 8 mm. longi breviter glanduloso-setulosi. Calyx poculiformis circ. 5 mm. longus ultra medium fissus cupula brevissima glanduloso-setulosa lobis 5 late ovatis vel subrotundatis obtusis extus glabris vel hinc et illinc rubro-glanduloso-setulosis. Corolla circ. 3.5 cm. longa infundibuliformis extus plus minusve puberula supra in limbum 5-lobatum ampliata lobis inaequalibus rotundatis emarginatis maximo circ. 1 cm. longo circ. 1.7 cm. lato. Stamina 10 inaequalia longissima circ. 2.3 cm. longa filamentis glabris antheris subglobosis circ. 2 mm. longis. Ovarium glanduloso-setulosum stylo glabro. Capsula paullo curvata ex apice pedicelli oblique oriens dense glanduloso-setulosa circ. 2 cm. longa 5 mm. lata. Semina oblonga circ. 2 mm. longa complanata ad extremitates carnoso-carunculata ala laterali praedita.

Species strigillosa ex affinitate *Rh. Smithii*, Nutt. folii indumento albido-persistente distinguenda.

Bhutan. Pumthang. 6′ bush under Abies. Flowers dried. White lining under leaf. Alt. 11,000. R. E. Cooper. No. 4115. 5th July 1915.

The young fruiting specimens collected by Mr. Cooper show some dried flowers which have sufficed for the foregoing description, which is incomplete. There is no doubt about the distinctness of the plant as a species. Amongst other strigillose Himalayan ,Rhododendrons—*Rh. barbatum*, Wall., *Rh. lancifolium*, Hook. f., and *Rh. Smithii*, Nutt.—Mr. Cooper's plant finds in *Rh. Smithii* its likest form, but the white indumentum is not deciduous in flocks as in that species.

4859 **Rhododendron basilicum,** Balf. f. et W. W. Sm.

Frutex vel arbuscula ad 9 m. alta. Rami ultimi crassi 1 cm. diam. hornotini dense rufo-tomentosi annotini nigro-grisei tomenti vestigiis obtecti. Alabastrorum globosorum perulae late ovatae acuminatae tomentosae. Folia magna petiolata

ad 25 cm. longa ; lamina crasse coriacea ad 22 cm. longa ad 13 cm. lata obovata apice rotundata retusa mucronulata margine vix revoluta basi obtusa haud cordulata supra atro-viridis costa media sulcata venis primariis utrinsecus ad 15 impressis caeteroquin laevis in morem squali corii leviter rugulosa et glabra sed tamen hic illic vestigiis tomenti juvenilis notata infra costa media venisque primariis elevatis ubique indumento duplice vestita superstrato uniformi cinnamomeo subporriginoso haud scintillante e squamulis pluricellularibus stipitatis infundibuliformibus (?) fimbriatis constructo substrato albido scintillante floccifero e pilis latis brevibus vacuis vesiculosis ; petiolus ad 3.5 cm. longus validus purpureo-niger porriginosus. Inflorescentia magna racemoso-corymbosa 25-flora rhachi cinnamomeo-tomentosa ; bracteae fertiles oblongae mucronulatae ad 3.5 cm. longae 1 cm. latae extus et superne intus sericeae ; pedicelli ad 3 cm. longi pallide tomentosi sub calyce oblique expansi eglandulosi. Calyx tomentosus lobis inaequalibus plus minusve triangularibus circ. 3 mm. longis. Corolla late campanulata subobliqua carnosula pallide flava basi rubro-maculata circ. 3.5 cm. longa, tubo circ. 2.5 cm. longo intus glabro lobis rotundatis emarginatis circ. 1.5 cm. longis. Stamina 16 inclusa filamentis vix puberulis. Ovarium ovoideum sursum angustatum sulcatum pilis longis filiformibus tortuosis ferruginosis fasciatis dense tomentosum eglandulosum ; stylus glaber staminibus longior corollam subaequans ; stigma discoideum lobulatum. Capsula stricta vel leviter curvata ad 2 cm. longa 5 mm. lata dense rufo-tomentosa. Semina spadicea complanata ad 2 mm. longa anguste membranaceo-arillata.

Species magnifica a *Rh. lacteo*, Franch. longe distans, forsan *Rh. fictolacteo*, Balf. f. affinis sed foliorum ovariique indumento, floribus flavis bene distincta.

Yunnan. Shweli-Salween Divide. Lat. 25° 30′ N. Alt. 11,000 ft. Shrub of 10–20 ft. Flowers fleshy pale yellow. In Rhododendron thickets. G. Forrest. No. 12,078. June 1913.

Yunnan. Western flank of the Shweli-Salween Divide. Lat. 25° 20′ N. Alt. 10,000–11,000 ft. Shrub of 20–30 ft. Flowers deep crimson. In Rhododendron forest. G. Forrest. No. 8990. August 1910.

A beautiful large-leaved yellow-flowered species with red blotches at the base of the corolla. The general form of the foliage is that of *Rh. fictolacteum*, Balf. f., but the indumentum of the leaves as well as of the ovaries is quite different.

4859 **Rhododendron cephalanthoides,** Balf. f. et W. W. Sm.

Rh. cephalanthum, Diels non Franch. in Notes, R.B.G., Edin., vii (1912), 105.

Fruticulus aromaticus parvifolius ad 1.5 m. altus subdichotome et breviter et tortuose ramosus. Ramuli hornotini dense citrino-lepidoti circ. 1 mm. diam. annotini fulvi stipitibus squamularum decapitatarum albido-scabridi deinde nigro-scabridi tandem grisei decorticantes. Alabastrorum parvulorum perulae mox deciduae exteriores ovatae carinatae apiculatae fulvae ad 6 mm. longae dorso lepidotae margine apicem versus minutissime ciliolatae intus adpresso-puberulae interiores membranaceae obovato-spathulatae flavidae vix carinatae obtusae margine subsetuloso-ciliatae ad 1 cm. longae 5 mm. latae. Folia petiolata ad 2 cm. longa ; lamina crasse coriacea oblonga vel oblongo-elliptica vel elliptica ad 1.8 cm. longa 8 mm. lata apice obtusa breviter vel longe corneo-mucronulata nunc emarginatim recurvata margine revoluta setularum squamarumque pedibus plus minusve punctulata (in juventute setulis sparsis et squamis fimbriata) basi obtusa nec cordulata supra atro-viridis plana (costa media sulcata caeteroquin venarum reti occulto) squamarum peltatarum juvenilium vestigiis siccis subasperata (in juventute squamis citrinis ubique obtecta) infra fulva porriginosa squamis peltatis concoloribus longius et brevius stipitatis ex umbone convexo plus minusve rubescente institaque late fimbriata aedificatis longioribus stratum superum construentibus costa media elevata straminea ; petiolus ad 5 mm. longus lepidotus. Flores albi fragrantes in umbellam parvam capituliformem circ. 10-floram rhachi sparsim puberula congesti ; bracteae steriles coriaceae late ovatae carinatae apiculatae fulvae dorso lepidotae margine praecipue apicem versus sublanatim ciliatae intus puberulae ad 6 mm. longae fertiles submembranaceae obovato-spathulatae vel obovatae circ. 8 cm. longae 5 mm. latae extus lepidotae margine longe ciliatae intus puberulae ; prophylla circ. 7 mm. longa 1.5 mm. lata calyce paullo breviora anguste spathulata dorso lepidota margine ad basim lepidota supra breviter ciliata ; pedicelli circ. 3 mm. longi sparse lepidoti. Calyx late campanulatus ad 6 mm. longus fere ad basim subaequaliter quinquelobatus lobis ellipticis vel oblongis apice obtusis vel rotundatis sub-erosis et pilis longis contortis plurimis vel paucis ciliatis ad 4 mm. latis viridibus membranaceis dorso lepidotis intus glabris. Corollae carnosulae circ. 1.8 cm. longae obliquae tubus circ. 1 cm. longus extus puberulus intus villosus in limbum parvum antice patentem postice suberectum elongatus lobis 5 subaequalibus imbricatis rotundatis crenulatis circ. 5 mm. diam. Stamina 5 inclusa circ. 6 mm. longa filamentis supra basim incrassatis glabris antheris oblongis circ. 1.5 mm. longis.

Ovarium 5-lobatum conoideum circ. 1.5 mm. longum dense flavido-lepidotum; stylus vix 0.75 mm. longus claviformis stigmate 5-lobato coronatus.

Species cum *Rh. cephalantho*, Franch. olim confusa sed valde diversa et notis sequentibus facile distinguenda :—alabastrorum perulis late ovatis obtusis mox deciduis nec acuminatis persistentibus, foliis minoribus, prophyllis bracteisque haud villosis calycem subaequantibus, corollae tubo extus puberulo.

Yunnan. Eastern flank of the Lichiang Range. Alt. 11,000–11,500 ft. Lat. 27° 10′ N. Branched shrub of 2–4 ft. Flowers white, fragrant. Dry ledges of limestone cliffs. G. Forrest. No. 2182. May 1906.

Yunnan. Eastern flank of the Lichiang Range. Alt. 11,000–12,000 ft. Lat. 27° 25′ N. Shrub of 2–3 ft. Flowers white, foliage fragrant with a resinous odour. Limestone cliffs and humus-covered boulders. G. Forrest. No. 5866. May 1910.

This Lichiang plant in No. 2182 was referred by Diels* to *Rh. cephalanthum*, Franch. But it is very different from that species. At a glance one notices the absence of the persistent foliage-bud scale-leaves on the branches so characteristic of *Rh. cephalanthum*, and the shape of the scale-leaves broadly ovate blunt with a mucro in *Rh. cephalanthoides* and narrow long sharply pointed in *Rh. cephalanthum* is an obvious diagnostic mark.

Rh. acraium, Balf. f. et W. W. Sm. of the Chungtien Plateau (Forrest No. 10,652) is a much nearer ally, but it wants the scabrid branches and has a smaller corolla not puberulous outside.

Forrest has two specimens from the Lichiang Range which resemble closely *Rh. cephalanthoides*, described above, from the Eastern flank of the same range. The labels on Forrest's specimen bear :—

Yunnan. Western flank of the Lichiang Range. Alt. 12,000 ft. Lat. 27° 25′ N. Symmetrically shaped shrub of 2–6 ft. Flowers white, foliage aromatic. Amongst rocks on alpine meadows. G. Forrest. No. 5878. June 1910.

Yunnan. Lichiang Range. Alt. 13,000 ft. Lat. 27° 25′ N. G. Forrest. No. 10,312. June 1913.

Although the second ticket does not bear " Western flank," Mr. Forrest believes it is from that station. I record this, for the details of structure do not quite conform. There are minor differences in flower structure between Forrest's Nos. 5878, 10,312 and *Rh. cephalanthoides*, but we do not know enough about these plants to enable us to fix specific limits, and may regard them meanwhile as forms of *Rh. cephalanthoides*. The occurrence of allied species showing slight differences is to be

* Diels in Notes R.B.G., Edin., vii (1912), 165.

expected in the floras of the Eastern and Western flanks of a range like that of the Lichiang corresponding with the drier and wetter climatic conditions of the flanks respectively.

The Szechwan plant named *Rh. cephalanthum*, Franch. by Rehder and Wilson is not Franchet's species. It is nearer to *Rh. cephalanthoides* and *Rh. acraium*. *Rh. cephalanthum* is a Yunnan plant restricted as we know it to the Tali Range.

See also p. 316.

4860 **Rhododendron chamaetortum,** Balf. f. et Ward.

Suffrutex nanus ramosissimus late patens ad 15 cm. altus parvifolius. Ramuli breves annotini fusco-rufi squamis peltatis rubiginosis longe breviterque stipitatis dense obtecti nunc stipitibus squamarum longarum decapitatarum setuloso-pubescentes vetustiores grisei (fungorum mycelio nigro plerumque pubescentes) mox decorticantes. Alabastrorum elongatorum acutorum perulae angustae a basi lanceolatae acutae vel acuminatae nervo medio carinatae fusco-rufae lepidotae eciliatae serius lignescentes per annos plures persistentes. Folia crasse coriacea breviter petiolata ad 2 cm. longa; lamina ad 1.6 cm. longa ad 8 mm. lata oblonga vel elliptico-oblonga apice obtusa corneo-mucronulata nunc emarginato-recurvata margine paullo revoluta integra basi obtusa vel late cuneata supra atro-viridis squamarum peltatarum vestigiis conspersis subasperata costa media paullo sulcata caeteroquin leviter rugulosa subtus ferruginea indumento squamarum peltatarum bistrato praedita strati superi squamis stipite longo institaque lata strati inferi stipite brevi institaque angusta praeditis costa media pallida basim versus sparsim lepidota prominula; petiolus ad 3 mm. longus lepidotus. Flores pallide rosei plures (circ. 8) ad extremitates ramulorum racemoso-capitatim aggregatae rhachi puberula; bracteae externae coriaceae ovatae parvae circ. 5 mm. longae breviter acuminatae carinatae dorso lepidotae margine delicatim ciliatae interiores obovatae obtusae cucullatae extus molliter puberulae vix lepidotae margine pilis contortis ciliatae circ. 6 mm. longae 4 mm. latae saepe ad apicem rubidae; prophylla ramentacea pallide brunnea spathulata circ. 7 mm. longa 1.5 mm. lata calyce breviora dorso puberula sparse lepidota margine lanato-ciliata; pedicelli inaequales supremi ad 5.5 mm. longi puberuli et lepidoti. Calyx rubidus fere ad basim in lobos 5 fissus cupula extus puberula lobis tenuiter membranaceis extus intusque glabris vel luteo-lepidotis margine flavido-lepidotis pilis paucis nunc ciliatis inaequalibus lobo antico minimo circ. 4 mm. longo 2 mm. lato oblongo lobis postero-lateralibus maximis saepe connatis ad 5 mm. longis. Corollae obliquae circ. 1.2 cm. longae tubus ab axe curvatus

antice circ. 5 mm. longus extus glaber intus praecipue ad faucem villosulus, limbi explanati lobi rotundati vel orbiculares circ. 6 mm. diam. minute crenulati. Stamina 5 tubum corollinum antice subaequantia circ. 5 mm. longa filamentis deorsum dilatatis glabris, antheris oblongis aurantiacis. Ovarium circ. 1.5. mm. longum ovoideum 5-lobatum plus minusve lepidotum viscidum ; stylus porphyreus ovarium subaequans glaber sursum clavatim dilatatus et stigmate 5-lobato coronatus.

Species alabastrorum perulis persistentibus, inflorescentiae rhachi puberula, pedicellis puberulis et lepidotis, corolla pallide rosea, staminum filamentis glabris notisque aliis facile recognoscenda.

Tibeto-Yunnan frontier. Ka-gwr-pw glacier valley. 15,000 ft. Dwarf, forming carpet 6 ins. high. Flowers pink. F. Kingdon Ward. No. 431. June 1913.

This delightful alpine shrub belongs to the Cephalanthum series. Its dense trusses of pink flowers evidently produced in numbers upon the close carpet of green vegetative shoots must be a pleasing sight, and one hopes that Mr. Ward may have obtained seed of the plant. In the series of which *Rh. cephalanthum*, Franch. as the oldest described species is the centre there is no species for which *Rh. chamaetortum* can be mistaken. The indumentum of the leaf under-surface is marked by the compactness of the upper stratum of disks of the peltate scales, and these are broad and show clearly their structure to superficial examination. The colour of indumentum recalls *Rh. gymnomiscum*, Balf. f. et Ward and *Rh. nwaiense*, Balf. f. et Ward, both of which are yellow-flowered species.

See also p. 315.

Rhododendron chryseum, Balf. f. et Ward.

Suffrutex nanus parvifolius ramosissimus. Ramuli annotini circ. 1 mm. diam. squamis sanguineo-rufis dense furfuracei vetustiores mox glabrescentes cinerei decorticantes. Alabastrorum parvorum oblongo-fusiformium perulae parvae extus rufae lepidotae intus stramineae acutae eciliatae. Folia crasse coriacea ad 1.5 cm. longa breviter petiolata ; lamina oblonga vel subobovata ad 1.3 cm. longa 5 mm. lata rotundata apice integra vel emarginata mucronulata margine integra leviter recurvata basi cuneata supra atro-viridis squamis peltatis impressis sucinonitentibus contiguis uniformiter induta costa media sulcata caeteroquin plana, subtus pallidior squamis rufescentibus et pallide viridibus intermixtis fere contiguis vestita intervallis minutis glaucis costa media paullo elevata squamosa venarum reti ultimo occulto ; petiolus ad 3 mm. longus lepidotus. Flores aurei in umbellas subsessiles ad 6-floras terminales aggregati

rhachi lepidota ; bracteae fulvae late ovatae vel subrotundatae ad 6 mm. longae apiculatae margine breviter ciliatae dorso lepidotae mox deciduae ; prophylla ramentacea lineari-claviformia ad 5 mm. longa eciliata vel ad apicem parce ciliata calyce breviora ; pedicelli ad 5 mm. longi dense furfuraceo-lepidoti. Calyx circ. 4 mm. longus in lobos 5 inaequales fere ad basim fissus viridis cupula dense lepidota et saepe erubescente lobis oblongis vel ovatis vel ellipticis apice acutis vel obtusis vel rotundatis et erosis saepe per paria connatis dorso dense lepidotis intus puberulis margine lepidoto-fimbriatis et praecipue apicem versus sparsim setulosis. Corolla aurea ad 1.3 cm. longa tubo brevi circ. 2.5 mm. longo extus glabro intus praecipue ad faucem albo-villosulo in limbum late infundibuliformem 5-lobatum ampliato lobis oblongis circ. 1 cm. longis circ. 6 mm. latis dorso nitenti-lepidotis margine minute crenulato-denticulatis. Stamina 5 corollam subaequantia filamentis validis intra tubum corollinum complanatis et supra basim floccoso-villosulis superne glabris fulvis antheris fuscis. Ovarium subconoideum lobatum circ. 2 mm. longum squamis viscidis lepidotum ; stylus exsertus stamina breviter superans validus basi plus minusve puberulus ; stigma discoideum lobulatum.

Species *Rh. flavido*, Franch. valde affinis indumento densiore, inflorescentia ad 6-flora, corolla extus densius lepidota, staminibus 5, stylo stamina aequante basi puberulo facile distinguenda.

Tibeto-Yunnan frontier. Ka-gwr-pw glacier valley. 13,000–15,000 ft. Dwarf. Yellow. F. Kingdon Ward. No. 540. June 1912 ; 13,000–14,000 ft. Dwarf. Granite screes. F. Kingdon Ward. No. 577. 27th June 1913.

A species of the Lapponicum series. This the Yunnan form of the Szechwan *Rh. flavidum*, Franch. is readily distinguishable from that species. The indumentum of the under side of the leaf has many more scales which are set much closer upon the greyish surface, and the scales are bicolour, about one-half dark brown, one-half pale green, equally intermixed ; the inflorescence is larger and so are the flowers ; the corolla is copiously lepidote outside, not sparingly so or not at all as in *Rh. flavidum*, and then there are only 5 stamens—apparently constantly. The style is shorter and is puberulous at the base. Rehder and Wilson describe *Rh. flavidum*, Franch. var. *psilostylum*, which they separate from *Rh. flavidum*, Franch. by its duller green leaves, lepidote flowers, smaller calyx, glabrous style, smaller and more globose fruits. Ward's plant is not this variety, two of the given characters of which seem not valid—the lepidote flower and the glabrous style—both of these I find in Franchet's type.

See also p. 299.

Rhododendron clivicolum, Balf. f. et W. W. Sm.

Frutex aromaticus parvifolius ad 1.5 m. altus ramosissimus saepe virgatus. Ramuli hornotini flavido-lepidoti subviscidi annotini circ. 2 mm. diam. fulvi indumento compacto e squamis peltatis stipitatis et stipitibus setulosis squamarum decapitatarum constructo obtecti vetustiores cinerei decorticantes. Alabastrorum parvorum oblongorum perulae deciduae paucae externae fuscae ovatae vel ellipticae coriaceae extus lepidotae margine minutissime ciliatae circ. 3 mm. longae interiores membranaceae spathulatae circ. 7 mm. longae 3 mm. latae extus dense lepidotae et puberulae superne ciliatae. Folia crasse coriacea ad 3 cm. longa petiolata ; lamina oblonga vel elliptico-oblonga vel elliptica ad 2.5. cm. longa ad 1 cm. lata mucronulata margine asperata basi obtusa vel late subcuneata supra atro-viridis squamarum juvenilium vestigiis minutis pulverulenta costa media sulcata caeteroquin paullo reticulatim rugulosa subtus spadiceo-brunnea squamis peltatis contiguis parvis breviter stipitatis partim fuscis partim albidis uniformiter induta sed hic et illic squama singula majore intensius colorata subpunctulata costa media elevata primo omnino lepidota deinde plus minusve nuda straminea sparsim lepidota venis primariis plus minusve visibilibus ; lamina juvenilis utrinque flavido-lepidota subtus intensius et squamis magnis paucis viridibus conspersa margine sparse setulosa copiose lepidota ; petiolus circ. 5 mm. longus fusco-lepidotus. Flores tubo luteo limbo albo in umbellas capituliformes terminales racemose aggregati inflorescentiae rhachi puberula ; bracteae mox deciduae ; prophylla ramentacea subspathulata ad 8 mm. longa ad 2 mm. lata calycem aequantia ubique puberula dorso lepidota margine ciliata ; pedicelli squamis magnis paucis lepidoti circ. 4 mm. longi saepe purpurascentes. Calyx ad 4 mm. longus fere ad basim fissus viridis nunc purpurascens cupula glabra lobis inaequalibus imbricatis foliaceis haud tenuiter membranaceis opacis ovatis vel oblongis vel ellipticis apice acutis vel obtusis vel subrotundatis vel truncatis nunc subfimbriatim erosis dorso squamulis latis ubique lepidotis margine pilis longis tortuosis ciliatis, post anthesin auctis ad 6 mm. longis. Corollae circ. 1.8 cm. longae extus omnino glabrae subobliquae tubus longus antice 1 cm. longus intus villosulus subcylindricus sursum paullo ampliatus et in lobos 5 rotundatos integros circ. 6 mm. diam. expansus. Stamina 5 circ. 5 mm. longa filamentis deorsum dilatatis basim versus puberulis, antheris oblongis 1 mm. longis. Ovarium circ. 1.5 mm. longum lobatum dense flavido-lepidotum ; stylus circ. 0.75 mm. longus validus clavatus ruber stigmate lobato coronatus.

Species *Rh. anthopogonoidi,* Maxim. valde affinis sed foliis minoribus calyce elepidoto corolla multo longiore diversa.

Yunnan. Mountains in the N.E. of the Yangtze bend. Alt. 11,000–12,000 ft. Lat. 27° 45′ N. Shrub of 3–5 ft. Foliage aromatic. Flowers white tube yellow. On ledges of limestone cliffs and rocky slopes. G. Forrest. No. 10,585. July 1913.

A species not far removed from *Rh. anthopogonoides*, Maxim. but with smaller leaves and larger flowers, while the calyx in the two species is very different. In *Rh. clivicolum* the lobes are green, foliaceous not translucent, with large lepidote scales on the back and apparently increasing much in size after flowering is over. In *Rh. anthopogonoides* the calyx lobes are membranous translucent and elepidote outside. *Rh. cremnophilum*, Balf. f. et W. W. Sm. is also an ally, being one of the Fragrans series, but its smaller elliptic leaves and rose-coloured flowers separate it.

See also p. 293.

3969 **Rhododendron complexum,** Balf. f. et W. W. Sm.

Suffrutex parvifolius intricatim ramosissimus. Ramuli annui breves circ. 1.5 cm. longi hornotini ferrugineo-lepidoti seniores nigricantes demum decorticantes. Alabastra parvula circ. 2 mm. longa oblonga extus perulis paucis ferrugineo-lepidotis crassis vestita. Folia crasse coriacea petiolata ad 1 cm. longa; lamina elliptica vel oblongo-elliptica ad 8.5 mm. longa ad 4.5 mm. lata obtusa minute mucronulata margine vix revoluta basi rotundata vel obtusa vel late cuneata supra atro-viridis canescens squamis peltatis uniformibus fere contiguis persistentibus adpressis (umbone depresso plus minusve flavescente instita lata albida) induta subtus ferruginea subnitens squamis uniformibus discontiguis persistentibus in foveolas immersis umbone plus minusve resinoso-rubro institaque spadicea praedita intervallis esquamosis pallide viridibus papillis epidermicis ceriferis notatis; petiolus circ. 1.5 mm. longus ferrugineo-lepidotus. Flores in umbellas congestas 3-floras terminales conferti; bracteae steriles exteriores rotundatae crustaceae brunneae in dorso medio lepidotae margine albo-ciliatae fertiles membranaceae verruculosae subspathulatae apicem versus lanato-ciliatae; pedicelli vix 1 mm. longi lepidoti. Calyx minutus cupula dense lepidota purpurea lobis 5 inaequalibus vel aequalibus duobus postero-lateralibus maximis ovatis vel rotundatis circ. 1 mm. longis dorso lepidotis vel elepidotis plus minusve lanato-ciliatis purpureis. Corolla 1.2 cm. longa violacea extus elepidota a basi infundibuliformis tubo circ. 6 mm. longo intus supra ovarium pubescente sursum in limbum disco concavo ampliatim expanso lobis circ. 7 mm. longis oblongo-ellipticis undulatis. Stamina 5 stylo duplo longiora filamentis corollae tubum vix excedentibus supra basim latam puberulis antheris

parvis ad basim loborum corollae exsertis. Ovarium in triente inferiore laete viride et pilis paucis vestitum supra dense lepidotum; stylus brevis ovario paullo longior staminibus multo brevior purpureus glaber; stigma atro-purpureum lobulatum. Capsula circ. 3 mm. longa rufo-brunnea basi calyce inclusa lepidota ab apice ad basim valvis 5 dehiscens.

Species *Rh. intricato*, Franch. similis sed foliis subtus ferrugineis squamis discontiguis uniformibus corollaque extus elepidota notata.

Yunnan. Open stony pasture on the Chungtien plateau. Lat. 27° 30′ N. Alt. 11,000–12,000 ft. Matted shrub of 1–2 ft. Flowers deep rose purple. G. Forrest. No. 12,520. June 1914.

An interesting species which shows us a stage somewhat intermediate between the Lapponicum series and the Fragrans and the Cephalanthum series. *Rh. complexum* by habit and indumentum is one of the set within the Lapponicum series which have truly discontiguous under-leaf indumentum with brown impressed scales on a mat green ground, while the leaves are small, dark green above, such as we find in *Rh. impeditum*, Balf. f. et W. W. Sm. and in *Rh. scintillans*, Balf. f. et W. W. Sm. But in flower it differs. The corolla tube is here elongated, much ventricose at base, and the limb spreads out from it often nearly flat. Within the long tube the stamens and style are concealed. The anthers just reach to the mouth of the tube. The style is much shorter than the stamens and only a little longer than the ovary. The whole flower construction recalls *Rh. intricatum*, Franch. where we find precisely the same relationships, but in vegetative features *Rh. intricatum* is very different from *Rh. complexum*. Its under-leaf indumentum is shining grey or yellowish grey with contiguous scales, and the upper leaf surface, owing to the scale vestiges, is somewhat hoary. The divergence of flower character of which I speak has therefore taken place more than once in the phyletic history of the series. I have preferred to retain *Rh. complexum* as well as *Rh. intricatum* in the Lapponicum series. Although they have a corolla so different from that in the rest of the series it never develops the copious beard of the Fragrans series and Cephalanthum series. And then the under-leaf indumentum of *Rh. complexum* is unknown in these other series, nor, indeed, is that of *Rh. intricatum* found there although the resemblances are greater in its case.

See also p. 299.

4562 **Rhododendron cremnophilum,** Balf. f. et W. W. Sm.

Suffrutex pumilus ad 6 dm. altus parvifolius tortuose ramosus. Ramuli annui brevissimi circ. 5 mm. longi hornotini squamis peltatis stipitatis citrinis lepidoti biennes fulvi triennes squamis

siccescentibus nigricantibus stipite conspicuo induti deinde grisei squamarum decapitatarum stipitibus scabrido-setulosi decorticantes. Alabastrorum oblongorum acutiusculorum perulae mox deciduae externae ellipticae vel late ovatae vel ovato-rotundatae circ. 3 mm. longae 2.5 mm. latae vix carinatae coriaceae fulvae extus lepidotae margine minutissime ciliatae intus puberulae interiores subspathulatae vel obovato-spathulatae membranaceae nervo medio prominulo obtusae ad 8 mm. longae 4 mm. latae stramineae basi sucino-coloratae extus lepidotae margine longe ciliatae intus puberulae. Folia ad 1.5 cm. longa breviter petiolata ; lamina crasse coriacea elliptica vel oblongo-elliptica ad 1.2 cm. longa 9 mm. lata apice corneo-mucronulata saepe recurvata margine paullo revoluta squamis peltatis vel squamarum stipitibus vel setularum juvenilium pedibus asperata nunc sparsissime setulosa (in juventute semper setulosa) basi obtusa vel subrotundata supra atro-viridis rugulosa squamarum delapsarum vestigiis obscuris exasperata (in juventute citrino-lepidota) costa media sulcata subtus flavido-fulva compacto-lepidota squamis peltatis contiguis persistentibus ex umbone convexulo pallide fuscescente institaque leviter fimbriata angusta vix umbonem aequante aedificatis paucis longius stipitatis sed indumenti superficie fere uniformi (in juventute dense citrino-lepidota) costa media elevata laxe lepidota ; petiolus ad 4 mm. longus plus minusve glaber nunc purpurascens. Flores pallide rosei in umbellam terminalem ad 10-floram capituliformem rhachi puberula racemose congesti ; bracteae mox deciduae exteriores coriaceae ovatae vel rotundatae spadiceo-brunneae extus lepidotae margine minute ciliatae intus puberulae interiores fertiles membranaceae flavidae basi sucino-coloratae obovatae apice rotundatae nunc rubidae extus nitenti-lepidotae et puberulae margine pilis tortuosis longe ciliatae intus puberulae ad 8 mm. longae 4 mm. latae ; prophylla circ. 6 mm. longa calyce longiora anguste spathulata uninervia ramentacea dorso lepidota margine longe ciliata ; pedicelli breves circ. 2 mm. longi lepidoti. Calyx circ 4 mm. longus ad basim fissus viridis nunc rubidus lobis imbricatis subaequalibus oblongis circ. 2 mm. latis apice sub-erosis truncatis margine ipso ciliato extus lepidotis intus glabris. Corollae circ. 1 cm. longae pallide roseae tubus basi cylindricus sursum oblique ampliatus infundibuliformis extus glaber intus dense villosus circ. 8 mm. longus, limbi patuli subrepandi discus circ. 0.5 mm. latus, lobi subrotundati saepe subirregulares (posticus maximus circ. 4 mm. diam.) margine inaequaliter ctenulati. Stamina plerumque 5 filamentis deorsum paullo expansis infra minute puberulis circ. 5 mm. longis, antheris ovoideis circ. 0.5 mm. longis. Ovarium circ. 1.5 mm. longum 5-lobatum squamulis contiguis parvis lepidotum ; stylus rubidus

ovario brevior circ. 1 mm. longus glaber sub stigmate clavatus ; stigma planum 5-lobatum.

Species ex affinitate *Rh. anthopogonoidis*, Maxim. sed foliis minoribus ad 1.5 cm. longis, bracteis interioribus lepidotis et puberulis haud sericeis, calyce minore lepidoto, corolla rosea haud flava recedens.

Yunnan. Mountains of the Chungtien plateau. Alt. 13,000 ft. Lat. 27° 30′ N. Matted shrub of 2 ft. Flowers pale rose. Ledges of cliffs and boulders. G. Forrest. No. 12,631. July 1914.

A dwarf species this, belonging to a small series including *Rh. anthopogonoides*, Maxim., *Rh. clivicolum*, Balf. f. et W. W. Sm., *Rh. fragrans*, Maxim. and *Rh. primulaeflorum*, Franch. They resemble both the Cephalanthum series and the Anthopogon series in many characters, but they have not the loose indumentum of Cephalanthum nor the rufescent agglutinate indumentum of Anthopogon. *Rh. cremnophilum*, is marked out from its fellows by the small elliptic or slightly oblong-elliptic leaves and its short twisted branches, and is in all its parts smaller than either *Rh. anthopogonoides* and *Rh. clivicolum*. Then its flowers are rose coloured, as they are in *Rh. fragrans*. I may add that the cuticle on the epidermal cells is very thick, exceeding the lumen of the cells, and the epidermal papillae are conoid or even ovoid and set very close together.

See also p. 293.

3997 **Rhododendron diacritum,** Balf. f. et W. W. Sm.

Suffruticosum nanum ad 5 dm. altum intricatim ramosissimum haud virgatum. Ramuli hornotini squamis ferrugineis dense laete porriginosi seniores squamarum reliquiis verruculosi deinde sordide grisei mox decorticantes. Alabastrorum parvulorum circ. 2 mm. longorum oblongo-ovoideorum perulae paucae ovatae crassiusculae ferrugineae lepidotae. Folia crassa coriacea parva petiolata ; lamina elliptica vel oblongo-elliptica ad 8 mm. longa 5 mm. lata plerumque minor apice obtusa vel rotundata obscure mucronulata margine leviter recurva et undulata basi obtusa vel late cuneata vel subrotundata supra griseo-viridis squamis albidis peltatis uniformibus contiguis persistentibus umbone nunc flavido-nitente lepidota costa media vix manifesta subtus alutacea squamis peltatis contiguis biformibus omnino induta (squamarum plerisque adpressis ex umbone flavido-nitido institaque albida constructis caeteris paucioribus majoribus stipite longiore et umbone institaque rufescenti-nitida superficiem punctulis notantibus) costa media vix elevata venis primariis occultis ; petiolus circ. 2 mm. longus crassus rufo-squamulosus. Flores parvi solitarii terminales ;

bracteae steriles pallide brunneae ovatae acutae fertiles oblongae cucullatae obtusae mucronulatae circ. 3.5 mm. longae dorso lepidotae apice delicate ciliatae; bracteolae ligulatae membranaceae apice extus lepidotae sursum haud expansae calyce dimidio longiores; pedicelli circ. 1 mm. longi albido-lepidoti sub calyce paullo dilatati. Calyx circ. 1.5 mm. longus pallide viridis extus ex toto dense albido-lepidotus in lobos 5 crassiusculos inaequales maximum circ. 1 mm. longum et latum margine lanato-ciliatos fissus. Corollae roseo-purpureae fauce albo circ. 1 cm. longae tubus latus brevis circ. 1.5 mm. longus basi paullo gibbosus intus ad faucem leviter puberulus sursum in limbum brevem concavum expansus, lobi 5 oblongi circ. 3 mm. longi extus conspicue albo-lepidoti. Stamina 10 subaequalia corollam aequantia filamentis pallide roseis supra basim dense villosis faucem corollae occludentibus antheris roseo-purpureis. Ovarium pallide viride albido-lepidotum; stylus tenuis roseo-purpureus glaber corolla staminibusque multo longior; stigma parvum lobulatum. Capsula grisea lepidota circ. 4 mm. longa ad basim 5-valvata.

Species fastigiata *Rh. drumonio*, Balf. f. et Ward et *Rh. telmateio*, Balf. f. et W. W. Sm. affinis squamis subfoliaribus punctulatis, foliis oblongis subtus ravis, floribus parvis solitariis roseo-purpureis, calyce parvo, corollae tubo brevi ad faucem puberulo lobisque extus dense lepidotis, staminibus 10 corollam aequantibus, filamentis villosis, stylo glabro staminibus multo longiore notata.

Yunnan. Mountains of the Chungtien plateau. Lat. 27° 30′ N. Alt. 13,000–14,000 ft. Matted shrub of 12–20 inches. Flowers deep rose purple, throat white. Open situations on cliffs and humus-covered boulders. G. Forrest. No. 12,614. July 1914.

A bright floriferous species of the Lapponicum series. It is one of the plants which, like *Rh. drumonium*, Balf. f. et Ward and *Rh. telmateium*, Balf. f. et W. W. Sm., has punctulate underleaf indumentum and also a lepidote corolla. Its floriferousness as seen on dried specimens is remarkable. A small shrublet with very thin erect twigs, it resembles in that both the species named, being likest *Rh. telmateium* in its hoary appearance but differing in its oblong or oblong elliptic not narrowly lanceolate leaves. *Rh. drumonium* is readily separated by its shorter style only about equalling not longer than the stamens.

See also p. 299.

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Rhododendron drumonium, Balf. f. et Ward.

Suffrutex nanus ad 30 cm. altus parvifolius in pulvinos aggregatus vel late diffusus quasi ericetum quoddam minutum. Ramuli erecti plurimi annotini circ. 1 mm. diam. dense squamis

rufis furfuracei seniores nigro-verruculosi dein grisei decorticantes. Alabastrorum parvulorum oblongorum perulae paucae extus rufo-lepidotae margine ciliatae vix 1.5 mm. longae. Folia crasse coriacea petiolata ad 1 cm. longa; lamina oblonga vel anguste elliptica apicem basimque versus angustata ad 8 mm. longa ad 3 mm. lata apice mucronulata margine paullo recurvata basi late cuneata et obtusa supra atro-viridis lepidoto-canescens squamis peltatis superficialibus fere contiguis uniformibus ex umbone annulatim flavescenti-nitente et instita lata albida aedificatis subtus alutacea sparsim brunneo-punctata nitens squamis contiguis persistentibus biformibus imbricatim induta plerisque spadiceis umbone depresso sucineo institaque albida paucioribus majoribus altioribus umbone resinoso-rubro institaque lata brunnea costa media supra vix conspicua subtus vix elevata venis primariis utrinque occultis; petiolus circ. 1.5 mm. longus rufo-lepidotus. Flores solitarii terminales; bracteae paucae externae crustaceae oblongo-ellipticae vel rotundatae cucullatae dorso squamis biformibus mox deciduis rufo-lepidotae margine apicem versus lanato-ciliatae internae subspathulatae pallidae dorso apicem versus lepidotae plus minusve ciliatae; pedicelli circ. 1 mm. longi rufo-lepidoti; bracteolae ligulatae longae pedicellum excedentes. Calyx fere ad basim in lobos 5 aequales oblongos obtusos virides vel purpureos haud membranaceos dorso plus minusve lepidotos margine eciliatos fissus. Corolla purpureo-coerulea fere rotata tubo brevi circ. 2 mm. longo basi subventricoso extus sparsissime puberulo intus ad faucem puberulo neque albo-villoso limbi disco angustissimo lobis patentibus fere planis oblongo-ellipticis circ. 5 mm. longis dorso dense albido-lepidotis. Stamina 8–10 fere aequalia vix corollam aequantia filamentis purpureis pilis paucis aggregatis supra basim planam et ovarium praeditis antheris lateritiis. Ovarium squamis peltatis viridescentibus lepidotum; stylus purpureus glaber staminibus brevior vel aequilongus; stigma atropurpureum lobulatum. Capsula circ. 4.5 mm. longa brunnea albido-lepidota valvis 5 ad basim dehiscens.

Species fastigiata inter seriem squamis subfoliaribus contiguis biformibus punctulatis corollaque extus lepidota notatam *Rh. telmateio*, Balf. f. et W. W. Sm. persimilis sed habitu, floribus parvulis, staminibus styloque subaequalibus diversa.

Yunnan. Valley of Chung River. Alt. 10,500 ft. Dwarf shrub forming carpet or separate tufts 9 ins. to one foot high in open pine forest. F. Kingdon Ward. No. 269A. May 1913.

One of the small number of species in the Lapponicum series of Rhododendrons with contiguous bicolour punctulate scales on the under side of the leaf and with a lepidote corolla. From *Rh. diacritum*, Balf. f. et W. W. Sm. and from *Rh. telmateium*,

Balf. f. et W. W. Sm. it is distinguished by having the style just about the length of the stamens. *Rh. nigropunctatum*, Franch. is a typical member of this punctulate set of species, but it has an elepidote corolla, as has also *Rh. alpicolum*, Rehder and Wilson.

See also p. 299.

Rhododendron euchroum, Balf. f. et Ward.

Frutex nanus procumbens late patens vix ad 6 dm. altus umbraticola. Ramuli annotini circ. 2 mm. diam. floccis et pilis singulis et glandulis glaucis stipitatis intermixtis tomentosi vetustiores glabri purpurei mox grisei desquamantes. Alabastrorum parvorum ovoideorum perulae exteriores ovatae acuminatae carinatae circ. 5 mm. longae pilis floccosis dense griseo- vel ex parte rufo-tomentosae. Folia coriacea petiolata ad 8 cm. longa juvenilia ignota; lamina ad 6.5 cm. longa ad 2 cm. lata lanceolata vel oblanceolata apice acuta breviter acuminatim apiculata margine cartilaginea plana basi in petiolum attenuata, supra glabra viridis hic et illic pilorum juvenilium vestigiis et glandulis conspersa costa media anguste et profunde sulcata venis primariis utrinsecus ad 7 obscuris superficie plana subtus costa media a basi elevata et sparsim tomentosa apicem versus tomento occulta superficie caeteroquin (epidermide epapillosa) lana ferruginea scintillante dense vestita indumento bistrato superstrato persistente nunc detersili e pilis longe stipitatis ramulis longis erectis unicellularibus vesiculosis plus minusve rufis tortuosis intertextis substrato nunquam detersili e pilis breviter stipitatis ramulis horizontaliter patentibus albidis aedificato; petiolus purpureus circ. 1.5 cm. longus pilis longis densis floccosis etiam glandulis rubris paucis vestitus tandem plus minusve nudus. Flores ad 5 in umbellam veram laxe dispositi rhachi inter bracteas glanduloso-tomentosa; bracteae ignotae; pedicelli circ. 1 cm. longi validi pilis longis glandulisque brevibus dense obtecti sub calyce inexpansi. Calyx parvus sine basi cupulari in lobos 5 oblongos dense tomentosos vix 1 mm. longos divisus. Corolla carnosula laete rubro-ochracea tubulosa sursum ampliata limbo 5-lobato campanulato circ. 3 cm. longa extus eglandulosa epilosa basi 5-gibbosa intus glabra basi varis atrorubris saepe pilis glandulosis praeditis notata lobis rotundatis integris circ. 1.2 cm. longis 1 cm. latis. Stamina 10 inaequalia longiora vix corolla breviora filamentis deorsum latioribus et a medio ad basim albo-pubescentibus. Ovarium angustum circ. 5 mm. longum pilis floccosis dense ferrugineo-tomentosum in stylum sursum attenuatum; stylus corollam subaequans basi pilis floccosis plus minusve obtectus; stigma lobatum.

Species *Rh. floccigero*, Franch. affinis foliorum indumento,

corolla minore, staminum filamentis pubescentibus valde diversa.

E. Upper Burma. Nwai Divide. Ridge of Naung-Chaung. Alt. 10,000 ft. Dwarf procumbent shrub of spreading habit on granite ridge, damp shady situations under bamboos. Stem rising 1½–2 ft. from ground. Flowers bright brick red. Kingdon Ward. No. 1778. 14th July 1914.

A beautiful species carrying into Burma the group of Rhododendrons with medium-sized succulent bright coloured corollas, to which the Chinese *Rh. floccigerum*, Franch., *Rh. haematodes*, Franch., and others belong.

4864 **Rhododendron glischrum,** Balf. f. et. W. W. Sm.

Arbor parva ad 8 m. alta. Ramuli hornotini flavido-virides dense glanduloso-setulosi glandulis ovoideis nigro-rubris stipite setuloso stramineo vel luteo ad 4.5 mm. longo vel brevi vetustiores flavidi esetulosi. Alabastrorum perulae oblongae obtusae viscidae annos plures plus minusve persistentes. Folia breviter petiolata ad 22 cm. longa; lamina oblanceolata ad 20 cm. longa ad 5 cm. lata apice acuminata tuberculo corneo terminata margine cartilaginea pectinatim glanduloso-setulosa basi late cuneatim attenuata supra olivacea costa media sulcata et praecipue basim versus plus minusve setulosa venis primariis acute adscendentibus utrinsecus circ. 15 subsulcatis caeteroquin areolatim subrugulosa glabrescens sed glandularum setiformium juvenilium vestigiis obscuris plus minusve notata, subtus pallidior subcinnamomea costa media venisque primariiis et marginem versus secondariis elevatis ubique setulis longis glandulosis decurvatis dense hispida; petiolus circ. 2 cm. longus glanduloso-setulosus. Flores racemose umbellati inflorescentia circ. 10-flora, rhachi glanduloso-setulosa; bracteae externae ad 5 cm. longae basi parva incrassata vix 4 mm. lata longe et anguste caudatae extus glanduloso-setulosae intus sulcatae glabrae intermediae basi latiore rotundata amplexicauli circ. 1.5 cm. diam. caudam aequante extus plus minusve glanduloso-setulosae intus adpresso-puberulae intimae subspathulatae vel obovatae extus intusque dense sericeae; prophylla vix 1 cm. longa filiformia pubescentia; pedicelli circ. 3.5 cm. longi dense glanduloso-setulosi. Calyx viridis circ. 1.5 cm. longus fere ad basim in lobos 5 fissus cupula extus glanduloso-setulosa lobis aequalibus circ. 8 mm. latis foliaceis oblongis obtusis margine ciliatis intus nitidis apicem versus nunc adpresso-puberulis. Corolla circ. 3 cm. longa infundibuliformis extus intusque glabra in limbum circ. 1 cm. longum expansa lobis 5 rotundatis 2 cm. latis emarginatis. Stamina 10 tubum corollinum aequantia filamentis deorsum dilatatis et basim versus glanduloso-pubescen-

tibus antheris 3.5 mm. longis atro-purpureis. Ovarium setulis glandulosis dense albo-setulosum; stylus staminibus paullo longior basi glanduloso-setulosus. Capsula viscida calyce viscido inclusa circ. 1.5 cm. longa 4.5 mm. lata recta calyci obliqua dense glanduloso-setulosa. Semina fusca oblonga complanata ad 2 mm. longa ad extremitates pilis latis punctulatis cristatim carunculata.

Species forsan ex affinitate *Rh. strigillosi*, Franch. foliis oblanceolatis, floribus longe pedicellatis, calyce magno, staminibus pubescentibus, ovario styloque glanduloso-setulosis valde diversa.

Yunnan. Kari Pass, Yangtze-Mekong Divide. Lat. 27° 40′ N. Shrub of 25 feet. Flowers? In fruit. Open situations in thickets and pine forests. G. Forrest. No. 12,901. July 1914; No. 13,564. Oct. 1914.

Mr. Forrest's specimens have withered flowers only and there is no record of colour. The description given above of the flower is therefore incomplete. The plant is most distinct as a species.

Rhododendron gymnomiscum, Balf. f. et Ward.

Frutex aromaticus dumetorum alpinorum erecto-ramosus saepe subvirgatus. Ramuli annotini fulvo-brunnei squamis peltatis stipitatis dense obtecti et stipitibus squamarum decapitatarum plus minusve setulosi indumento annos plures persistente saepe nigricante vetustiores cinerei decorticantes. Alabastrorum parvorum ovoideo-oblongorum perulae mox deciduae paucae oblongae obtusae spadiceo-brunneae dorso lepidotae margine minute ciliatae. Folia crasse coriacea ad 3.5 cm. longa petiolata; lamina oblonga ad 3 cm. longa ad 1 cm. lata apice obtusa vel acutiuscula mucronulata margine paullo revoluta integra squamis asperata basi obtusa vel late subcuneata supra atro-viridis costa media sulcata caeteroquin reticulatim leviter rugulosa et squamarum juvenilium glandulosarum viscidarum vestigiis plus minusve notata subtus primo fulvida ultimo subrufescens superficiem porriginosam planam exhibens indumento vix spongioso e squamis instita angusta et stipite brevi subuniformiter constructo costa media elevata primo squamis occulta deinde flavida sparsim rufo-lepidota; lamina juvenilis utrinque plus minusve flavida glanduloso-lepidota margineque longe ciliata; petiolus circ. 5 mm. longus fusco-lepidotus. Flores lutei in umbellas terminales ad 7-floras parvas racemose aggregati inflorescentiae rhachi pubescente elepidota; bracteae exteriores late ovatae vel subrotundatae ad 6 mm. longae 5 mm. latae fusco-brunneae dorso lepidotae margine longe ciliatae ecarinatae mucronulatae interiores obovatae vel

subspathulatae membranaceae circ. 8 mm. longae 3 mm. latae dorso lepidotae margine ciliatae intus puberulae; prophylla lineari-claviformia ramentacea extus lepidota margine ciliata circ. 7 mm. longa vix 1 mm. lata calycem aequantia; pedicelli inaequales purpurei glabri circ. 4 mm. longi. Calyx poculiformis fere ad basim 5-lobatus cupula rubida vel subviridi glabra lobis subaequalibus oblongis acutis vel obtusis vel rotundatis nunc subtruncatis membranaceis plus minusve rubidis dorso lepidibus laete viridibus obtectis margine lepidoto-fimbriatis et plus minusve minute ciliatis intus puberulis. Corollae tenuis circ. 1.5 cm. longae paullo obliquae tubus antice circ. 8 mm. longus extus glaber intus villosulus in limbum explanatum 5-lobatum expansus lobis subaequalibus rotundatis integris circ. 5 mm. diam. Stamina ad 6 mm. longa filamentis fragilibus deorsum dilatatis glabris antheris oblongis circ. 1 mm. longis. Ovarium 1.25 mm. longum ovoideum lobatum plus minusve lepidotum subviscidum; stylus circ. 2 mm. longus cylindricus apicem versus expansus ibique stigmate lobato coronatus.

Species ex affinitate *Rh. nwaiensis*, Balf. f. et Ward, gregis *Cephalanthi*, alabastrorum perulis mox deciduis, inflorescentiae rhachi pubescente, pedicellis glabris, calycis lobis rubidis viridilepidotis margine lepidoto-fimbriatis, corolla extus glabra, stylo quam ovarium fere duplo longiore notata.

Tibeto-Yunnan frontier. Ka-gwr-pw glacier. Scrub belt. Alt. 14,000 ft. Flowers yellow. Ward. No. 505. June 1913.

A plant of the Cephalanthum series; distinguished from most of the series, excepting *Rh. cephalanthum*, Franch. itself and *Rh. platyphyllum*, Balf. f. et W. W. Sm., by the size of the foliage. Its leaves reach a length of 3 cm. The indumentum, too, is not so spongy as in typical members of the series, in this resembling one of its allies in the series *Rh. nwaiense*, Balf. f. et Ward from a more southern station. From *Rh. nwaiense*, its nearest relation, the following are other diagnostic marks:—The scales of the vegetative bud are early deciduous, the inner bracts are much larger, the bracteoles equal in length the calyx, the pedicels are glabrous, the reddish calyx-lobes have curious green scales on the back and the margin is fringed with scales and has also a few short cilia, which may be the stalks of decapitated scales. See also what is said under *Rh. nwaiense*, Balf. f. et Ward, p. 252.

The glacier valley in which Mr. Ward found this yellow-flowered Rhododendron yielded to him another new species, *Rh. chamaetortum*, Balf. f. et Ward, forming carpets at a higher altitude and possessing pink flowers.

See also p. 316.

Rhododendron habrotrichum, Balf. f. et W. W. Sm.

Frutex ad 3 m. altus ramis crassis. Ramuli annotini nigro-purpurascentes circ. 3 mm. diam. strigillosi setulis rigidis purpurascentibus ad 6 mm. longis glandula ovoideo-capitata terminatis dense obtecti vetustiores estrigillosi vel vestigiis conspersi cinerei tandem decorticantes. Alabastrorum ovoideorum perulae fulvae paucae late ovatae obtusae margine subciliatae carinatae carina plus minusve glanduloso-setulosa. Folia petiolata ad 14 cm. longa; lamina coriacea elliptico-oblonga ad 12 cm. longa ad 7 cm. lata apice obtusa vel subacuminata mucrone corneo terminata margine cartilaginea pectinatim setulosa basi cordulata lobis rotundatis supra atro-viridis in juventute (costa media sulcata setulosa caeteroquin venarum reti obscuro) pilis glandulosis stipitatis vertice radiatim longe ramosis setulisque paucis conspersis induta in adultis (costa media basim versus setulosa cum venis primariis utrinsecus circ. 12 sulcata excepta) glabrescens areolato-venulosa, subtus (juvenilis et adulta) pallidior plus minusve fulva venarum reti elevato suberubescente costa media ad medium vel ultro setulosa caeteroquin plus minusve pilis subcaulifloris glandulosis punctulatim notata; petiolus crassus circ. 2 cm. longus 4 mm. latus dense glanduloso-strigillosus. Flores in umbellam multifloram compactam rhachi glanduloso-setulosa aggregati; bracteae steriles crustaceo-coriaceae a basi late ovatae vaginatae acuminatae vel subcaudatae dorso margineque glanduloso-setulosae intus puberulae et plus minusve glandulosae fertiles inaequales ad 2.5 cm. longae 1.5 cm. latae obovatae vel spathulatae haud crustaceae extus intusque sericeae apice acuminatae margine glanduloso-setulosae; prophylla brevia ad 8 mm. longa lineari-filiformia ramentacea sericea; pedicelli ad 2 cm. longi glanduloso-setulosi. Calyx ad 1.4 cm. longus extus glanduloso-setulosus intus glaber in lobos 5 a basi lanceolatos fere ad basim fissus; cupula lata; lobi acuti coriacei margine glanduloso-setulosi. Corolla pallide rosea ad 5 cm. longa infundibuliformis supra in lobos 5 inaequales ampliata extus intusque glabra lobis rotundatis maximis circ. 1.5 cm. longis 3 cm. latis emarginatis. Stamina 10 inaequalia (longissimum fere tubum corollinum aequans) filamentis deorsum dilatatis in triente infero dense puberulis antheris circ. 4 mm. longis. Ovarium cylindricum 5-lobatum dense glanduloso-setulosum; stylus staminibus paullo longior tubum corollinum paullo superans in triente infero glanduloso-setulosus supra expansus stigmate lobulato coronatus. Capsula ab apice pedicelli paullo decurvata calyce plus minusve persistente inclusa circ. 2 cm. longa 5 mm. lata nigra et glanduloso-setulosa. Semina straminea oblonga ad extremitates piloso-arillata.

Species *Rh. Smithii*, Nutt., forsan affinis sed calyce longiore, filamentis pubescentibus, stylo glanduloso-setuloso omnino diversa.

Yunnan. Western flank of the Shweli-Salween Divide. Lat. 25° 20′ N. Shrub of 3–8 ft. In fruit. Rhododendron forest. G. Forrest. No. 9048. Aug. 1912.

Yunnan. Shweli-Salween Divide. Lat. 25° 30′ N. Shrub of 6–10 ft. Flowers pale rose. Open situations in Rhododendron thickets and amongst rocks. G. Forrest. No. 12,054. June 1913.

This may be looked upon perhaps as a W. Chinese representative of the Himalayan *Rh. Smithii*, Hook. f. The Chinese and Himalayan species are readily distinguishable by the indumentum of the leaf under-side, which, though cast in the same mould in the two species, forms tufts of woolly tomentum in the Himalayan plant. It has also much larger flowers and many other characters of separation. The prominent resemblance is in the bristles.

Rhododendron haemonium, Balf. f. et Cooper.

Frutex parvus ramis plurimis foliisque coriaceis supra atro-viridibus subtus sanguineis. Ramuli annotini circ. 2 mm. diam. saepe virgati squamis rufis peltatis stipitatis obtecti et squamarum decapitatarum stipitibus quasi setulosi vetustiores grisei saepe nigricantes mox decorticantes. Alabastrorum oblongo-ovoideorum perulae mox deciduae externae parvae circ. 5 mm. longae 2.5 mm. latae oblongae carinatae acutae vel acuminatae coriaceae dorso rufo-lepidotae ciliatae. Folia petiolata ad 3.5 cm. longa; lamina crasse coriacea ad 2.8 cm. longa ad 1.2 cm. lata oblonga apice obtusa corneo-apiculata margine revoluta integra basi obtusa subrotundata nec cordulata supra atro-viridis squamarum juvenilium vestigiis pulverulenta costa media sulcata caeteroquin reticulatim subsulcata subtus costa media straminea elevata sparsim rufo-lepidota caeteroquin squamis sanguineo-resinosis longius breviusque stipitatis in stratum laeve agglutinatis decorata; petiolus circ. 8 mm. longus rufo-lepidotus. Flores lutei in umbellas capituliformes multifloras racemose dispositi; bracteae externae coriaceae late ovatae vel rotundatae carinatae acutae vel acuminatae vel obtusae et apiculatae interiores spadiceo-brunneae spathulatae ad 7 mm. longae ad 3 mm. latae extus rufo-lepidotae et subsericeo-puberulae longiuscule ciliatae intus plus minusve puberulae; prophylla subclaviformia vel linearia ramentacea extus lepidota lanato-ciliata ad 6 mm. longa calycem subaequantia; pedicelli inaequales ad 4 mm. longi (inferi breviores) luteo-lepidoti. Calyx circ. 4 mm. longus fere

ad basim crateriformem fissus lobis oblongis vel oblongo-ellipticis vel rotundatis ad 2 mm. latis membranaceis nitidis viridibus obtusis nunc apice subdenticulatis dorso elepidotis vel sparsissime lepidotis margine apiceque pilis brevibus vel longis sparse vel copiose ciliatis intus glabris. Corollae circ. 1.4 cm. longae tubus latus brevis obliquus subcarnosulus antice circ. 6 mm. longus postice circ. 8 mm. extus lepidibus sparsissime conspersus intus villosulus ad faucem barbatus, limbi lati explanati subrepandi discus circ. 1.5 mm. latus, lobi magni rotundati ad 7 mm. diam. crenulati et utrinque lepidibus sparsissime conspersi. Stamina 5 circ. 5 mm. longa filamentis deorsum dilatatis glabris antheris oblongis circ. 1 mm. longis. Ovarium ovoideum 5-lobatum circ. 1.5 mm. longum lepidibus luteis plus minusve indutum nunc fere nudum subpurpurascens ; stylus ovarium aequans clavatus stigmate 5-lobato coronatus.

Species nova ex affinitate *Rh. anthopogonis*, Don floribus luteis calyce glabro et notis aliis multis valde diversa.

Bhutan. Pumo La Timpu, W. Alt. 13,000 ft. Shrub on hilltops. Flowers yellow. R. E. Cooper. No. 3903. 15th May 1915.

This is a distinct species of the Anthopogon series. It resembles somewhat the N.W. Himalayan yellow-flowered *Rh. hypenanthum*, Balf. f. for long confused with *Rh. anthopogon*, Don, but is distinguished at sight by the absence from its branches of clusters of persistent leaf-bud scale-leaves. From true *Rh. anthopogon*, Don the colour of the flower of *Rh. haemonium* is also diagnostic as it is from *Rh. fragrans*, Maxim. The glabrous character of its calyx also separates.

See also p. 286.

4860 **Rhododendron hedyosmum**, Balf. f.

Suffrutex aromaticus ad 30 cm. altus ramosissimus parvifolius. Ramuli hornotini virides squamis fuscis peltatis longe stipitatis plus minusve laxe induti vetustiores fusci deinde nigricantes decorticantes. Alabastra parva ovoidea acuta perulis mox deciduis carinatis anguste ovatis acutis dorso lepidotis margine ciliatis. Folia crasse coriacea breviter petiolata ad 2.5 cm. longa ; lamina elongato-oblonga ad 2 cm. longa ad 7 mm. lata apice corneo-mucronulata margine vix revoluta obscure ciliata stipitibusque squamarum asperata basi obtusa vel subcuneata supra atro-viridis squamarum juvenilium flavidarum vestigiis conspersis plus minusve pulverulenta costa media sulcata caeteroquin reticulatim rugulosa subtus sordide fusca squamis peltatis longius stipitatis instita subangusta in stratum distale laxum super stratum squamarum minus evolutarum dispositis costa media pallide flavido-viridi elevata sparsim lepidota;

petiolus ad 4 mm. longus laxe lepidotus. Flores cerini ad 7 in umbellas veras parvas terminales inter ramulos foliatos subflorales praecoces immersas aggregati inflorescentiae rhachi brevissima puberula; bracteae steriles sordide fuscae ovatae acutae coriaceae extus lepidotae intus adpresso-puberulae minute ciliatae fertiles membranaciores obovatae vel spathulatae luteae extus fusco-lepidotae ciliatae circ. 1 cm. longae 4 mm. latae pedicellum et calycem multo superantes mox deciduae; prophylla lineari-clavata flavida supra dorso lepidota lanato-ciliata circ. 1.3 cm. longa calycem aequantia conspicua persistentia; pedicelli circ. 5 mm. longi lepidoti. Calyx viridis fere ad basim fissus cupula sparsim ciliata lobis a basi lanceolatis vel anguste ovatis obtusis extus intusque glabris margine lepidotis nunc setulis sparsis etiam ciliatis. Corollae longe tubulosae obliquae subcarnosulae circ. 2 cm. longae tubus ab axe florali paullo curvatus extus glaber intus sparsim pubescens sursum in lobos 5 circ. 6 mm. longos subellipticos integros basi latos infundibuliformi-ampliatus. Stamina 5 filamentis ad basim bulbosim expansis glabris circ. 6 mm. longis, antheris oblongis. Ovarium 1.5 mm. longum 5-lobatum squamis plus minusve lepidotum viscidum; stylus ovarium aequans clavatus glaber stigmate 5-lobato coronatus.

Species *Rh. Sargentiano*, Rehder et Wilson affinis sed robustior et altior et foliis fere duplo longioribus, perulis haud persistentibus, floribus albido-cerinis, pedicellis brevioribus, calycibus multo minoribus, corollis majoribus elepidotis facile recognoscenda.

Szechwan ?

This plant appeared in the Royal Botanic Garden, Edinburgh, in two or three specimens amongst a batch of *Rh. Sargentianum*, Rehder et Wilson raised from seeds in 1909 under Wilson's number 1208. The seeds were the gift of Sir John Stirling Maxwell, Bart. of Pollok, who generously presented to the Garden his share of the spoils of Wilson's exploration. By its growth and size and shape of leaf it is so different from *Rh. Sargentianum* that we have been prepared for something not of the type. *Rh. Sargentianum* has flowered freely during the past few years—this plant flowered in 1916 for the first time, and then some weeks before *Rh. Sargentianum*, producing small trusses of waxy white flowers with much longer corolla-tube than that of *Rh. Sargentianum*, and wanting entirely the coating of scales on the outside. The plant is very different from *Rh. Sargentianum*. I do not know if it has turned up elsewhere in cultivation.

See also p. 316.

Rhododendron hippophaeoides, Balf. f. et W. W. Sm.

Fruticulus parvus ad 1.5 m. altus copiose ramosus ramis saepe intricatim intertextis. Ramuli juveniles saepe virgati circ. 2 mm. diam. squamis dense furfuracei ochracei, seniores reliquiis squamarum verruculosi cortice mox desquamante. Alabastrorum oblongorum parvorum .5 cm. longorum perulae oblongae pallide brunneae crustaceae subtus lepidotae margine ciliatae. Folia crasse coriacea petiolata ; lamina oblonga ad 3 cm. longa ad 1 cm. lata apice obtusa vel rotundata obscure mucronulata margine paullo revoluta basi cuneata, paginae superioris superficies atroviridis squamis breviter stipitatis peltatis ex umbone lutescente et instita aequilata albida translucente margine minutissime fimbriata constructis uniformibus contiguis obtecta inferioris ubique squamarum similium imbricatarum opertu pallido ochraceo-nitente occulta costa media supra paullo sulcata subtus prominula venis primariis opertis ; petiolus circ. 4 mm. longus dense lepidotus. Inflorescentia terminalis floribus subcoeruleis in umbellam capitulatam ad 7-floram aggregatis ; bracteae fulvae exteriores crustaceae late ovatae interiores submembranaceae rotundatae retusae vel truncatae omnes extus lepidotae margine ciliatae ; pedicelli circ. 4 mm. longi sub calyce haud dilatati dense lepidoto-tomentosi prophyllis filiformibus quam pedicelli dimidio brevioribus. Calyx ad basim fissus lobis 5 subaequalibus circ. 1.5 mm. longis oblongis vel ovatis extus dense lepidotis pilis longis praesertim ad apicem fimbriatis. Corolla extus elepidota subrotata circ. 1.2. cm. longa, tubo campanulato brevi circ. 2 mm. longo, limbi disco patente circ. 4 mm. lato intus pubescente, lobis 5 rotundatis circ. 8 mm. diam. undulatis. Stamina 8–10 subaequalia ex ore tubi corollini longe patentia limbo breviora filamentis corollae concoloribus supra basim villoso-cinctis, antheris spadiceis. Ovarium parvum tubum corollinum subaequans viride lepidotum ; stylus purpureus glaber staminibus brevior ovario duplo longior ; stigma stylo vix latius. Capsula ovoidea circ. 7 mm. longa et 3.5 mm. lata brunnea lepidota ; pedicellus elongatus fere ad 8 mm. longus.

Species aspectu *Rh. intricati*, Franch. ramulorum indumento furfuraceo, foliis majoribus, pedicellis sub calyce haud dilatatis, calyce pilis longis fimbriato, corollae tubo campanulato haud ventricoso, stylo quam ovarium duplo longiore distincta.

Yunnan. Valley of Chung River. Alt. 10,500 ft. Dwarf shrub forming carpets or separate tufts 9 ins. to 1 ft. high in open pine forest. Kingdon Ward. No. 269B. May 1913.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 11,000–12,000 ft. Shrub of 4–5 ft. Flowers

blue, drying lavender-blue. Open situations in alpine scrub. G. Forrest. No. 10,333. July 1913.

Yunnan. Duplicate of No. 10,333 in mature fruit. G. Forrest. No. 11,487. Oct. 1913.

Yunnan. Lichiang Range. Lat. 27° 30′ N. Alt. 10,000 ft. Shrub of 2 ft. Flowers pale bluish-rose. Open marshy meadows. G. Forrest. No. 12,461. June 1914.

Yunnan. Mountains west of the Fengkow Valley. Lat. 27° 40′ N. Alt. 12,000 ft. Shrub of 3–4 ft. Flowers lavender-blue, anthers indian red. Boggy peaty meadows. G. Forrest. No. 12,562. June 1914.

Yunnan. Mountains of the Chungtien plateau. Lat. 27° 30′ N. Alt. 14,000 ft. Shrub of 3–4 ft. Flowers lavender-blue. Open moist stony pasture. G. Forrest. No. 12,633. July 1914.

A striking species of the Lapponicum series, which in its many-flowered compact truss of blue-purple flowers suggests *Rh. intricatum*, Franch. But it is far removed from that species, which is an exceptional one in the Lapponicum series, as I have explained above when writing of *Rh. complexum*, Balf. f. et W. W. Sm. *Rh. hippophaeoides* finds its nearest ally in *Rh. Websterianum*, Rehder et Wilson. Like that plant it is hoary, but there is more yellow in the tint of its foliage and twigs. It is also a more virgate shrub than is Rehder and Wilson's species, and has much larger flower trusses—7-flowered instead of 2–3-flowered. I may add also that the style of *Rh. Websterianum* is often lepidote or hairy. In indumentum our species belongs to a set of species—*Rh. idoneum*, Balf f. et W. W. Sm., *Rh. polifolium*, Franch., in addition to *Rh. intricatum*, *Rh. thymifolium*, Maxim., *Rh. Websterianum*—which have remarkable shiny grey not punctulate under-leaf surface, the scales being large and almost or quite contiguous. *Rh. hippophaeoides* is now in cultivation.

See also p. 299.

3999 **Rhododendron idoneum,** Balf. f. et W. W. Sm.

Suffrutex nanus parvifolius pulvinatus ramis congestis ad 4 dm. altus. Ramuli annui breves vix 1 cm. longi, hornotini ferrugineo-lepidoti circ. 1.5 mm. diam. seniores sordide grisei corrugati mox decorticantes. Alabastrorum ovoideorum parvorum perulae ovatae spadiceo-lepidotae. Folia petiolata crasse coriacea circ. 8.5 mm. longa; lamina elliptica vel subrotundata nunc subovata circ. 6.5 mm. longa 4 mm. lata vertice rotundata neque angustata costae mediae apice deflexo et mucrone terminato leviter revoluta basi rotundata vel late obtusa supra atro-viridis subcanescens squamis peltatis contiguis

persistentibus adpressis uniformibus umbone languide flavido institaque alba constructis induta subtus helvola nitens squamis ut supra aedificatis uniformibus contiguis persistentibus lepidota costa media utrinque vix conspicua venisque caeteris occultis; petiolus circ. 2 mm. longus rufescenti-lepidotus. Flores in umbellam 2-floram terminalem dispositi; bracteae exteriores crustaceae ovatae vel rotundatae dorso lepidotae margine ciliatae interiores oblongae membranaceae extus pubescentes; pedicelli circ. 1 mm. longi lepidoti; bracteolae minutissimae. Calyx circ. 3 mm. longus fere ad basim in lobos 5 inaequales fissus, cupula lepidota, lobis saepe purpureis membranaceis oblongis vel a basi lanceolatis vel late ovatis obtusis vel acutis dorso lepidotis margine apiceque pilis longis ciliatis. Corollae purpureo-coeruleae circ. 1.2 cm. longae tubus brevis circ. 4 mm. longus infundibuliformis extus glaber intus ad faucem pilis lanatis albido-villosus, limbi discus concavus angustus, lobi late elliptici vel subrotundati circ. 8 mm. longi extus sparse lepidoti. Stamina 8–10 corollam aequantia filamentis supra basim prope faucem tubi corollini albo-villosis. Ovarium pallide viride canescens lepidotum; stylus glaber kermesinus corollam staminaque superans; stigma discoideum lobulatum. Capsulae circ. 5 mm. longae lepidotae pars inferior calyce inclusa.

Species fastigiata *Rh. polifolio*, Franch. affinis sed habitu, foliorum forma, corollae lobis extus lepidotis fauceque dense villoso diversa.

Yunnan. Mountains of the Chungtien plateau. Lat. 27° 30′ N. Alt. 13,000–14,000 ft. Open ledges of cliffs and stony pasture. G. Forrest. No. 12,623. July 1914. Cushion shrub 12–16 ins. Flowers deep purplish blue, throat white.

A remarkably floriferous species of the Lapponicum series with short not virgate branches. It comes near *Rh. polifolium*, Franch., but that species is an erect grower, with longer shoots, smaller flowers, and its corolla is not lepidote outside. Moreover, whilst the throat of the corolla in *Rh. polifolium* is pubescent and its stamens slightly pubescent above the base, there is not the conspicuous white villous tuft as in *Rh. idoneum*, Balf. f. et W. W. Sm. *Rh. idoneum* is the only species with lepidote corolla in a small group of the Lapponicum series which have contiguous grey-white or leather-coloured under-leaf indumentum of a shiny uniform character and not punctulate, and thus may readily be distinguished. In addition to *Rh. polifolium*, the allied species are *Rh. blepharocalyx*, Franch., *Rh. intricatum*, Franch., *Rh. hippophaeoides*, Balf. f. et W. W. Sm., and *Rh. Websterianum*, Rehder et Wilson.

See also p. 300.

Rhododendron impeditum, Balf. f. et W. W. Sm.

Suffrutex parvifolius nanus ad 5 dm. altus ramulis plurimis intertextis in pulvinos lignosos rotundatos evolutus. Ramuli hornotini brevissimi circ. 8 mm. longi 1 mm. diam. squamis peltatis ferrugineis dense furfuracei seniores nigricantes sordide grisei et decorticantes. Alabastrorum minutorum ovoideorum perulae externae ovatae crassiusculae extus lepidotae margine plus minusve ciliatae internae oblongae vel oblongo-spathulatae obtusae pilis marginalibus et apicalibus longis ciliatae. Folia coriacea breviter petiolata ad 1 cm. longa ; lamina ad 8.5 mm. longa 4.5 mm. lata elliptica apice rotundata obscure mucronulata margine paullo revoluta basi obtusa vix attenuata supra atro-viridis squamis peltatis uniformibus persistentibus fere contiguis stipite vix impresso umbone flavido vix nitente et instita albida integra quam umbo latiore constructis furfuraceo-lepidota subtus papillis epidermicis ceriferis truncatis cuboideis sub-glauca et squamis ut supra aedificatis discontiguis omnino ferrugineis in foveolis profundis umbone infra os foveolae de-presso orientibus induta venarum reti occulto costa media subtus basi excepta ; petiolus brevissimus vix 1.5 mm. longus ferru-gineus furfuraceo-lepidotus. Flores in umbellam plerumque 2-floram terminalem dispositi ; alabastra ovoidea bracteis externis ovatis vel subrotundatis extus lepidotis ciliatis mox deciduis ; pedicelli vix 1 mm. longi lepidoti. Calyx conspicuus circ. 3 mm. longus corollae tubum subaequans fere ad basim fissus tubo lepidoto, lobis viridibus vel subpurpurascentibus elepidotis vel nunc squamulas 1–2 gerentibus firmis oblongis vel subrotundatis vel subquadratis aequalibus vel inaequalibus obtusis ad apicem marginemque pilis longis undulatis paucis vestitis. Corollae violaceo-purpureae extus elepidotae tubus brevis circ. 3.5 mm. longus uniformiter cylindricus intus ad os breviter pubescens, limbi concavi discus circ. 2 mm. latus, lobi 5 late ovati vel oblongi vel subrotundati margine undulati circ. 8 mm. longi. Stamina 10 tubum corollinum subaequantia filamentis purpureis ad os corollae pilis rectis erectis floccosim cinctis antheris purpureis. Ovarium conoideum albido-lepi-dotum ; stylus purpureus glaber corollam staminaque multo excedens : stigma lobulatum. Capsula circ. 4 mm. longa rufescens vix lepidota.

Species fastigiata *Rh. oresbio,* Balf. f. et Ward et *Rh. scintil-lanti,* Balf. f. et W. W. Sm. affinis sed foliorum lamina vere elliptica, calycis forma et stylo puberulo recedit. *Rh. fastigiatum* Franch. corollam extus lepidotam possedit.

Yunnan. Eastern flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 15,000–16,000 ft. Dwarf matted shrub of 6–12 ins.

Flowers light purplish-blue. On open peaty pasture. Forrest. No. 5863. June 1910.

Yunnan. Western flank of the Lichiang Range. Lat. 27° 20′ N. Alt. 12,000–13,000 ft. Shrub of 6–20 ins. Flowers deep purplish-blue, throat white. Forming symmetrically rounded tufts on alpine meadows. Forrest. No. 5876. June 1910.

One of the species of the Lapponicum series of Rhododendrons which is in cultivation and commonly under the name of *Rh. fastigiatum*, Franch. Like that plant in its cushion-habit its foliage is very different, and one can distinguish the two plants at a glance. *Rh. fastigiatum* has a grey hoary appearance, *Rh. impeditum* dark green. Both the plants have discontiguous under-leaf scales, but whilst in *Rh. fastigiatum* the bare intervals of epidermis are greyish, often tinted slightly red, in *Rh. impeditum* the epidermis is mat green. The flower distinguishes them at once, for the corolla in *Rh. fastigiatum* is lepidote outside, in this new species elepidote. Its nearest ally is really *Rh. scintillans*, Balf. f. et W. W. Sm., but that has oblong leaves narrowed to the ends, not elliptic and rounded.

See also p. 300.

Rhododendron ixeuticum, Balf. f. et W. W. Sm.

Frutex ad 3.5 m. altus. Ramuli hornotini viscidissimi circ. 4 mm. diam. glandulis rubris clavatis longe stipitatis setiformibus dense obsiti vetustiores vestigiis siccis glandularum setiformium et cataphyllorum et bractearum et petiolorum annorum praeteritorum obtecti. Alabastra oblonga cataphyllis brunneis persistentibus externis oblongo-rotundatis firmis intermediis elongatis ligulatis circ. 2.5 cm. longis 5 mm. latis coriaceis extus glabris intus caulis secretione vernicosis intimis membranaceis pubescentibus. Folia ad 13 cm. longa ; lamina lanceolata vel oblanceolata ad 11.5 cm. longa ad 3.5 cm. lata apice subacuminata margine vix revoluta basi obtusa supra juventute floccis pilorum lanatorum glandulisque stipitatis intermixtis tomentosim vestita maturitate atro-viridis subnitens glabrescens costa media sulcata plus minusve tomentosa venis primariis utrinsecus ad 18 sulcatis caeteroquin squali corium simulans subtus dense lanato-tomentosa primo sublactea postea glandulis rubris stipitatis pilis intermixtis rufescens costa media prominula rubescente densius glandulosa venis primariis nonnunquam prominulis ; petiolus ad 1.5 cm. longus setuloso-glandulosus viscidissimus. Flores in umbellam ad 12-floram laxam racemose dispositi ; bracteae longe caudatae basi rotundatae coriaceae rubro-brunneae extus viscidae glandulis tuberculatae ; pedicelli ad 3 cm. longi viscidissimi glandulis rubris setiformibus brevibus et pilis paucis

brevibus dense vestiti. Calyx poculiformis fere ad basim 5-lobatus, lobis oblongis ad 1 cm. longis intus laevibus extus margineque dense setuloso-glandulosis. Corolla tubuloso-campanulata ad 3 cm. longa tubo circ. 2 cm. longo extus glabro intus ad basim posteriorem glanduloso, lobis ad 2 cm. latis emarginatis. Stamina 10 inaequalia tubum corollae aequantia, filamentis basi latioribus ibique glandulosis. Ovarium glandulis rubris ascendentibus stipitatis dense obtectum; stylus basi setuloso-glandulosus staminibus longior; stigma discoideum lobulatum. Capsula curvata glandulosa circ. 1.8 cm. longa 5 mm. lata.

Species *Rh. adenophoro*, Balf. f. et W. W. Sm. affinis, ramis vestigiis foliorum obtectis, tegmento glandularum stipitatarum viscidissimo distincta.

Yunnan. Kari Pass, Mekong-Yangtze Divide. Lat. 27° 40′ N. Alt. 12,000 ft. Shrub of 10–12 ft. In fruit. Open situations amongst boulders. G. Forrest. No. 12,944. August 1914.

Yunnan. Mekong-Salween Divide. Lat. 28° 10′ N. Alt. 13,000 ft. Shrub of 8–10 ft. Flowers? In fruit. In open thickets. G. Forrest. No. 13,244. Sept. 1914.

Yunnan. G. Forrest. No. 13,551. Oct. 1914. In mature fruit.

Yunnan. G. Forrest. No. 13,592. Nov. 1914.

A distinct species amongst Rhododendrons which have a white persistent favose indumentum on the under side of the leaf. The feature catching the eye in the dried specimens is that of the persistent dried leaf-bud scale-leaves bracts and leaf petioles clothing the old branches, all more or less sticking together by the viscid excretion of the setulose glands. These glands occur on every part of the shoot. The actual secreting gland-area is oblong or club-shaped at the end of a longer or shorter stalk. The longer ones are like setae and there are all lengths down to almost unstalked glands. The surfaces of the pedicels and calyx are made strigillose by them. On the under surface of the leaf they are not obvious, being buried amongst the lanate hairs—but they are present in numbers. On the upper surface of the old leaf there remain but a few scattered glands. The hairs of the tomentum of the leaf start as pluricellular pedicels which gradually lose themselves in many twisted thick-walled threads branching freely and interwoven, the ultimate branches having a pointed end.

The flowers for examination have not been of the best. It is possible that we have two species here, and that Nos. 13,244, 13,551, and 12,592 should be separated from No. 12,944.

Rhododendron jucundum, Balf. f. et W. W. Sm.

Rh. Souliei, Diels non Franch. in Notes, R.B.G., Edin., v (1912), 217.

Frutex vel arbor parva ad 6 m. altus ramis tortuosis plurimis brevibus. Ramuli hornotini glandulis rubris stipitatis obsiti subsetulosi annotini ad 3 mm. diam. glandularum vestigiis plus minusve verrucosi rubidi vetustiores griseo-albi mox desquamantes. Alabastrorum oblongorum acutorum circ. 3 mm. diam. perulae extimae rotundatae apiculatae vel breviter caudatae intermediae oblongae ad apicem brevissime ciliolatae intimae oblongo-spathulatae circ. 3 cm. longae submembranaceae apice erubescentes pubescentes. Folia ad 8 cm. longa longe petiolata ; lamina elliptica vel elliptico-oblonga vel fere oblonga ad 6.5 cm. longa ad 3.5 cm. lata apiculata lateribus paullo convexis margine cartilaginea basi cordata vel cordulata utrinque pilorum juvenilium vestigiis notata supra atro-viridis glabrescens costa media venisque primariis utrinsecus circ. 13 impressis subtus suberubescens papillis ceriferis brevibus petasiformibus glauca costa media elevata caeteroquin laevis venarum reti purpurascente haud elevato lamina in juventute supra pilis paucis stipitatis digitatim ramosis ramulis setiformibus conspersa subtus glandulis parvis caulifloralibus propinquis aurantiacis nunc albidis nunc rubidis et praecipue ad costam mediam glandulis stipitatis elevatis apice rubris obtecta ; petiolus circ. 1.5 cm. longus rubescens glandulis rubris longe stipitatis obtectus (subglanduloso-setulosus). Inflorescentia umbellata terminalis 5–8-flora ; bracteae ignotae ; pedicelli stricti rigidi rubescentes circ. 2 cm. longi glandulis rubris longe pedicellatis setulosim vestiti in cupulam calycinam expansi. Calycis cupula circ. 1 mm. longa glandulosa rubida, lobi oblongi obtusi vel apice rotundati circ. 5 mm. longi membranacei dorso plerumque eglandulosi margine glanduloso-ciliolati sed variabiles nunc vix evoluti nunc breviores et glandulosiores. Corolla rosea nunc pallida fere alba a basi angusta aperte campanulata circ. 3 cm. longa extus elepidota epilosa tubo intus pubescente lobis 5 rotundatis emarginatis circ. 1.2 cm. longis 2 cm. latis. Stamina 10 inaequalia longiora ultra basim loborum corollinorum leviter extensa filamentis infra latioribus dense pubescentibus antheris intense coloratis. Ovarium oblongum glandulis elevatis stipite longo capite rubro dense vestitum ; stylus eglandulosus pallidus glaber nonnunquam plus minusve minutissime puberulus corollae vix aequilongus staminibus longior ; stigma discoideum.

Species cum *Rh. Souliei,* Franch. olim confusa sed inquisitione curiosa notis sequentibus facile distinguenda :—foliorum juvenilium indumento ejusque vestigiis in foliis adultis, corollae forma, staminibus pubescentibus, stylo eglanduloso.

Yunnan. Open rocky situations on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 10,000–11,000 ft. Shrub of 4–8 ft. Flowers pale rose. Forrest. No. 4148. July 1906.

Yunnan. Dry rocky situations on mountain meadows on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 10,000–11,000 ft. Shrub of 6–10 ft. Flowers rose-pink. Forrest. No. 4150. July 1906.

Yunnan. Open mountain meadows on the margins of pine forests and cane brakes on the eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 11,000–12,000 ft. Shrub of 3–6 ft. Flower bright lavender-rose. Forrest. No. 4154. Aug. 1906.

Yunnan. Eastern flank of the Tali Range. Lat. 25° 40′ N. Alt. 12,000 ft. Shrub or tree of 10–20 ft. Flowers white or pale rose. Rhododendron forest. Forrest. No. 6765. July 1910.

This is a very different plant from *P. Soulici* with which Diels identified it. *Rh. Soulici*, Franch. is a Szechwan plant and is not recorded from Yunnan. *Rh. jucundum* is a plant restricted so far as we know to the eastern flank of the Tali Range in western Yunnan. Apart from the indumentum features, which are easily observed, the flower offers two distinctive characters: the corolla here has not the wide open form so marked in *Rh. Soulici*, and the style is quite glabrous.

The western flank of the Tali Range contributes three plants to Mr. Forrest's collection under Nos. 11,577, 11,578, and 11,601 which belong to the series including *Rh. jucundum*, and are probably new species.

Rhododendron ledoides, Balf. f. et W. W. Sm.

Fruticulus virgatus dense intricatim et tenuiter ramosus. Ramuli hornotini squamis laxis fulvis porriginosi annotini squamarum vestigiis nigricantibus induti stipitibus decapitatis albidis setuloso-hirsuti seniores nudi plus minusve grisei tandem decorticantes. Alabastra oblonga obtusa parva perulis mox deciduis anguste ovatis coriaceis extus lepidotis circumdata. Folia breviter petiolata circ. 1.7 cm. longa crasse coriacea; lamina lineari-lanceolata vel oblongo-lanceolata circ. 1.5 cm. longa 5 mm. lata apice obtusa corneo-mucronulata margine integra revoluta basi obtusa, supra atro-viridis costa media sulcata caeteroquin obscure venulosa et squamarum vestigiis conspersis subasperata, subtus fulva squamis contiguis inaequaliter stipitatis ex umbone convexo (fulvo-colorato in squamulis longe stipitatis) institaque fimbriata aedificatis porriginosim induta costa media elevata; petiolus circ. 2 mm. longus lepidotus. Flores in umbellam capituliformem terminalem rhachi

puberula congesti; inflorescentiae alabastra globosa; bracteae externae ovatae vel late ovatae obtusae carinatae fulvae coriaceae extus lepidotae margine minute albido-ciliatae; prophylla parva claviformia calyce breviora ciliata; pedicelli breves ad 1.5 mm. longi lepidoti. Calyx parvus circ. 2 mm. longus fere ad basim fissus lobis imbricatis subrotundatis vel subellipticis subtruncatis viridibus extus sparsim lepidotis intus adpresso-puberulis ciliatis. Corollae tubus circ. 1 cm. longus angustus circ. 1.5 cm. diam. paullo curvatus extus glaber intus villosulus, limbi explanati discus circ. 1 mm. latus, lobi circ. 3 mm. lati subrotundati leviter crenulati. Stamina 5 circ. 4 mm. longa filamentis complanatis deorsum paullo dilatatis supra basim leviter puberulis antheris oblongis. Ovarium ovoideum 5-lobatum squamis contiguis parvis dense lepidotum; stylus clavatus ovario paullo brevior stigmate 5-lobato coronatus.

Species lediformis ex affinitate *Rh. cephalanthi*, Franch. foliis parvis angustis, perulis deciduis, prophyllis calyce brevioribus, inflorescentiae rhachi puberula, pedicellis brevibus lepidotis, corolla extus glabra, staminum filamentis puberulis, stylo quam ovarium paullo breviore notata.

Yunnan. Mountains in the N.E. of the Yangtze bend. Alt. 13,000 ft. Lat. 27° 45′ N. Shrub of 2 ft. In fruit. Flowers? Open stony pastures. G. Forrest. No. 11,246. Sept. 1913.

This species of the Cephalanthum series is one of the narrow-leaved forms with twiggy shoots on which the leaf-bud scales do not persist. Its nearest ally is *Rh. sphaeranthum*, Balf. f. et W. W. Sm., known from the Fengkow Pass, which has flowered in cultivation. *Rh. ledoides* is also in cultivation but I have not heard that it has flowered. In width of foliage *Rh. ledoides* seems to be somewhat variable. Most of Forrest's specimens have quite narrow leaves, and the fruit trusses nestling amidst the twigs recall strongly the features seen in Ledum. One specimen shows the foliage larger and broader, and it might pass at sight for *Rh. sphaeranthum* But analysis brings out characters which sufficiently differentiate the two plants. Differentiating marks in *Rh. ledoides* are: the bracteoles shorter than the calyx (in *Rh. sphaeranthum* they are remarkably long and far exceed the calyx), the puberulous not lepidote rhachis of inflorescence, the corolla glabrous outside not puberulous and lepidote, the glabrous not puberulous filaments of the stamens, the style equal in length to the ovary, not very much shorter.

With *Rh. radinum*, Balf. f. et W. W. Sm., another lediform species of the Cephalanthum series, our species has also resemblance, but *Rh. radinum* has persistent not deciduous leaf-bud

scale-leaves, has sessile flowers, with corollas densely lepidote on the outside, and the style is much shorter than the ovary.

Of *Rh. ledoides* we have no perfect flowers, only withered ones attached to young fruits, and there are gaps therefore in the description.

See also p. 316.

Rhododendron lepidanthum, Balf. f. et W. W. Sm.

Frutex aromaticus ad 1.5 m. altus ramosissimus parvifolius. Ramuli hornotini squamis flavidis longe stipitatis lepidoti annotini squamarum decapitatarum stipitibus fulvis plus minusve setuloso-pubescentes vetustiores grisei decorticantes. Alabastrorum ovoideorum acutorum perulae pallide helvolae ovatae coriaceae dorso nitido-lepidotae margine breviter ciliatae mox deciduae vel partim persistentes. Folia crasse coriacea breviter petiolata ad 1.7 cm. longa; lamina anguste oblonga ad 1.5 cm. longa ad 6 mm. lata apice obtusa mucronulata margine cartilaginea revoluta pedibus setularum detersarum punctulata (in juventute plus minusve setulosa) basi obtusa vel cuneata supra atro-viridis costa media sulcata caeteroquin plana squamarum juvenilium flavidarum vestigiis subpulverulenta subtus cinnamomea squamis peltatis longius stipitatis umbonatis instita fimbriata cinctis inter se separatis indumenti spongiosi stratum superius facientibus stratum inferius squamarum senilium breviorum obtegentibus (in juventute dense flavido-lepidota) costa media elevata straminea sparse lepidota; petiolus circ. 3 mm. longus lepidotus. Flores albi in umbellas rhachi glabra capituliformes terminales multifloras (circ. 8) racemose aggregati; bracteae externae helvolae crustaceo-coriaceae ellipticae vel late ovatae plus minusve carinatae mucronulatae dorso nitido-lepidotae interiores submembranaceae circ. 6 mm. longae 3.5 mm. latae obovatae vel subspathulatae obtusae margine lanato-ciliatae; prophylla ad 7 mm. longa ramentacea subspathulata vel claviformia uninervia dorso lepidota margine ciliata calycem in floribus inferis aequantia; pedicelli inaequales superiores longiores ad 8 mm. longi lepidoti. Calyx viridis fere ad basim quinquelobatus circ. 4 mm. longus lobis membranaceis oblongo-ovatis acutis ad 2 mm. latis dorso lepidotis intus puberulis margine hirsuto-ciliatis. Corollae carnosulae circ. 1.2 cm. longae obliquae tubus ab axe florali curvatus circ. 7 mm. longus extus glaber intus ubique villosus basi subventricosus limbi explanati lobis 5 subrotundatis integris circ. 3 mm. diam. dorso dense flavido-lepidotis. Stamina 5 circ. 6 mm. longa filamentis basi subtumidis supra basim minute puberulis antheris oblongis circ. 1 mm. longis. Ovarium ovoideum circ. 2 mm. longum 5-lobatum squamis flavidis plus

minusve lepidotum viscidum; stylus ovario paullo brevior glaber clavatus stigmate lobato coronatus.

Species *Rh. Sargentiano,* Rehder et Wilson affinis sed fruticulus major et foliis longioribus, bracteis externis latioribus interioribus longioribus, corollae albae majoris tubo extus glabro diversa.

Yunnan. Lichiang Range. Alt. 11,000–14,000 ft. Lat. 27° 30′ N. Shrub of 2–5 ft. Flowers white, foliage aromatic. Alpine pasture, ledges and crevices of cliffs. G. Forrest. No. 10,034. May 1913.

An easily distinguished species of the Cephalanthum series. It stands somewhere between *Rh. cephalanthoides,* Balf. f. et W. W. Sm. and *Rh. Sargentianum,* Rehder et Wilson, having the larger shrubby habit and elongated leaves of the first-named species, and possessing only a few of the persistent scales which are present in the last-named. It has a slightly fleshy corolla, lepidote on the outside as in *Rh. Sargentianum,* but the scales are restricted to a median patch on the under side of the corolla-lobes, and then the corolla is white not yellow. Other marks of distinction from *Rh. Sargentianum,* are its ovate not oblong outer bracts and its puberulous stamens.

See also p. 316.

Rhododendron megacalyx, Balf. f. et Ward.

Arbor ramosa ad 7.5 m. alta. Rami annotini atrorubentes epilosi vestigiis squamularum albidarum conspersi vetustiores griseo-desquamantes. Alabastra oblonga acuta perulis externis epilosis eglandulosis rotundatis intimis obcuneatis apice rotundatis omnibus intus glabris extus lepidotis. Folia breviter petiolata lepidota ad 15 cm. longa; lamina oblongo-elliptica apice rotundata verrucula incrassata terminata nec acuta nec acuminata margine cartilaginea vix revoluta basi obtusa supra glabra laete viridis foveis squamarum delapsarum vel vestigiis ipsarum notata costa media venisque primariis utrinsecus ad 14 rubidis sulcatis infra pallidior subglauca costa media venisque primariis rubescentibus elevatis squamis superficialibus peltatis umbonem convexum annulo rubro et instita peripherica integra conspicua cinctum exhibentibus praedita caeteroquin papillis albidis baculiformibus et foveolis plurimis haud contiguis notata (foveola quaque squama peltata pallide umbonata annulo rubro institaque angustissima impleta) hic et illic squama majore superficiali eis costae mediae simili latius fimbriata punctata; lamina juvenilis utrinque omnino epidota squamulis paginae superioris imbricatis eis costae mediae inferae maturae similibus squamulis paginae inferioris (ut ad maturitatem) haud contiguis

et dimorphis; petiolus ad 1.5 cm. longus in morem costae mediae inferae lepidotus. Flores odorati in inflorescentiam umbellatam circ. 5-floram laxe dispositi; bracteae ignotae; pedicelli ad 3 cm. longi elepidoti eglandulosi atrorubri sub calyce expansi. Calyx magnus nigro-brunneus cupularis circ. 2.3 cm. longus chartaceus extus pseudo-furfuraceus basi incrassatus epilosus elepidotus lobis 5 rotundatis circ. 8 mm. longis 2 cm. latis obtusis margine membranaceis. Corolla magna circ. 9 cm. longa alba odorata late infundibuliformi-campanulata basi haud angustata squamulis translucentibus extus lepidota tubo circ. 6 cm. longo extus glabro, lobis 5 rotundatis circ. 4 cm. latis. Stamina 10 brevia tubo corollino inclusa filamentis basim versus plus minusve pubescentibus antheris magnis. Ovarium nigrum dense lepidotum squamis albidis translucentibus; stylus tubo corollino longior basi albo-lepidotus; stigma discoideum lobulatum. Capsula calyce inclusa recta circ. 2 cm. longa 1 cm. lata extus lutescenti-lepidota.

Species *Rh. crasso*, Franch. affinis sed splendidior et foliis oblongis semper obtusis, petiolis brevioribus, pedicellis elepidotis, calyce triplo majore et ad trientem fisso, corolla basi haud angustata, stylo basi solum lepidoto longe distans; *Rh. excellenti*, Hemsl. et Wilson peraffinis, notis foliorum simillima, pedicellis calyceque elepidotis distinguenda.

E. Upper Burma. Nwai Valley. Bushy tree of 15–25 feet, in rain forest, rather open ground, by stream, 7000–8000 ft. Flower white, smelling very sweetly of nutmeg. Kingdon Ward. No. 1628. 4th June 1914.

The plant is an ally of *Rh. crassum*, Franch.—belonging to the group of which that species may be taken as the centre—and like it has a loose few-flowered truss. Its flowers are larger and want the constricted base to the corolla tube which is found in *Rh. crassum*. Its large calyx, three times the size of that in *Rh. crassum*, its pedicels without scales, and the style lepidote only at the base, are also marks separating it. In foliage the species are somewhat alike, but though *Rh. crassum* varies considerably in form of leaf, its leaves always seem to have a sharp-pointed tip. In *Rh. megacalyx* the leaf apex is never pointed though the midrib ends in a hard wart. We hope that Mr. Bulley will have received seeds of this species and that we shall be able to compare it as a horticultural plant with its ally *Rh. crassum*.

And then there is *Rh. excellens*, Hemsl. et Wilson which the describers speak of as "undoubtedly the grandest of the Chinese Rhododendrons and comparable only with the Indian *Rh. Dalhousiae*, Hk. f. its nearest ally." But *Rh. excellens* is not really a very near ally of *Rh. Dalhousiae*. Its indumentum is

quite different. There are none of the setose hairs of *Rh. Dalhousiae* and the peltate leaf-scales are far apart, leaving a large area of leaf epidermal surface visible. As Hemsley and Wilson point out there is also the absence of scales on the outside of the corolla separating the species and that is an emphatic mark of divergence in this complex. *Rh. excellens* by all characters is one of the group of *Rh. crassum* and stands in it between *Rh. crassum* itself and *Rh. megacalyx*. From the former its oblong leaves and larger calyx sufficiently separate it; from the latter it differs in its longer narrower leaves, lepidote pedicels and calyx-cup, and in its smaller calyx. It has the indumentum of the leaf under-surface of *Rh. megacalyx*. Through the kindness of the Director of the Royal Gardens, Kew, I have been enabled to examine the type sheet of *Rh. excellens* and to compare it with Ward's specimens of *Rh. megacalyx*.

The prominent and easily observed differences are not the only marks of separation from *Rh. crassum*. Close examination of the leaf surface between the scales on the under surface of the leaf will show that the papillae of the epidermis are altogether different. In *Rh. crassum* these papillae are little low cupolas so that the sides of the papillae are divergent and a vallecular interval lies between their tops. Only where there is a scale is there lengthening of the papillae. Beneath the scale fringe the papillae are elongated and inclined towards the stalk of the scale thus increasing as it were their protective value. But in *Rh. megacalyx* the epidermal papillae are vertical rods of some length and their sides are parallel. They are set close together. All these papillae have a granular wax-coat. Further, in *Rh. crassum* the pits on the under side of the leaf in which the scales are set are not very deep; the stalk of the scale brings the umbo to the mouth of the pit on a level with the surface of the adjacent epidermis and the scale fringe has space to spread horizontally as it does. Very different is it in *Rh. megacalyx*. There the pits on the under side of the leaf are deep, the umbo which has very thin cells is not brought to the mouth of the pit on a level with the epidermal surface, there is no room for lateral extension of the fringe of the scale, and it is not only narrower but is turned upwards so that the scale to surface view has a cuplike appearance. That this space relation is in causal connection with the narrowness and direction of the fringe I am not prepared to assert, because the single specimen of young expanding leaves which I have seen suggests that from the outset and before the leaf-surface pits are developed the size and direction of the fringe are determined. The condition is of interest looking to the modification of form of the elements of indumentum in the genus. From

simple hairs one passes to flocks, dendroid forms, fasces, saucers, to chalices and fringed chalices, all of which forms are, within limits, definite group marks.

Rhododendron mollicomum, Balf. f. et W. W. Sm.

Frutex ad 2 m. altus parvifolius virgatus esetulosus. Ramuli hornotini purpurei albo-pubescentes squamis paucis peltatis breviter stipitatis instita angusta cinctis resinosis lepidoti pilis longis contortis coloratis glandulosis carnosulis praediti annis 2–3 post nudi decorticantes et liberum interiorem fibrosum argenteum detegentes. Alabastrorum ovoideorum perulae exteriores late-ovatae vel rotundatae crustaceae extus puberulae et lepidotae margine longe ciliatae intimae oblongae carinatae acutae erubescentes indumento eodem margine breviter ciliatae. Folia ad 2.5 cm. longa petiolata ; lamina crasse coriacea ad 2 cm. longa ad 7 mm. lata oblonga vel oblongo-obovata apice acutiuscula corneo-mucronulata margine cartilaginea ciliata admodum revoluta basi subcuneatim obliqua utrinque dense puberula venarum reti costa media excepta occulto supra opaca viridis (costa media paullo sulcata) sub indumenti pilis glandulis paucis rubris conspersa marginem versus tuberculis vestigialibus paucissimis minutissimis praedita subtus pallidior inter pilos indumenti squamis peltatis in foveolas immersis ex umbone magno concavo luteo- vel rubro-resinoso institaque angusta erecta aedificatis induta ; petiolus circ. 5 mm. longus indumento paginae inferae vestitus. Inflorescentia ex umbellis 1–2-floris in axillis foliorum ad apices ramorum orientibus spiciformiter constructa ; bracteae umbellarum exteriores crustaceo-coriaceae late ovatae vel rotundatae extus adpresso-puberulae et lepidotae, interiores membranaceae spathulatae circ. 1 cm. longae 1.5 mm. latae extus puberulae lepidotae ; prophylla circ. 1 cm. longa circ. 1 mm. lata ligulata extus puberula et lepidota ; pedicelli circ. 1 cm. longi ramulorum indumento praediti. Calyx extus puberulus et lepidotus crateriformis minutus vix 1 mm. longus margine obscure 5-lobulatus lobulis semilunatis. Corollae obliquae ad 1.7 cm. longae coccineae tubus infundibuliformis extus sparse intus conspicue puberulus in limbum 5-lobatum ampliatus lobis elliptico-oblongis circ. 7 mm. longis extus lepidotis. Stamina 10 inaequalia longe exserta filamentis tenuibus basi glabris supra basim ad medium puberulis antheris elliptico-oblongis circ. 2 mm. longis. Ovarium subcylindricum 5-sulcatum dense lepidotum et puberulum circ. 3.5 mm. longum ; stylus longissimus tenuis stamina multo superans circ. 3 cm. longus in triente infero puberulus ; stigma discoideum supra lobulatum. Capsula 1 cm. longa 5 mm. lata subcylindrica fulva puberula et squamis luteo-nitidis lepidota. Semina pallide straminea longitudinaliter striata oblonga saepe

curvata et angulata ad extremitates obscure lobulato-carunculata circ. 1.5 mm. longa.

Species *Rh. spicifero*, Franch. affinis setarum inopia foliis puberulis admodum revolutis diversa.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 10,000–11,000 ft. Shrub of 4–6 ft. Flowers crimson? Open thicket. G. Forrest. No. 10,347. June 1913; No. 11,490. Oct. 1913.

I have not found it easy to discriminate between the two species of Franchet, *Rh. spiciferum*, Franch. and *Rh. scabriusculum* Franch., both of which belong to a series of Rhododendrons with characteristic indumentum. *Rh. mollicomum*, Balf. f. et W. W. Sm. is a very distinct species although in many ways like Franchet's species, but it wants entirely their characteristic rough setae and is smooth and soft all over.

There are two specimens in Mr. Forrest's collections, both from the Chungtien Plateau at 9000–10,000 ft. under Nos. 12,402 and 12,619, which are also this species I believe. They have larger flowers and a more developed calyx, and Mr. Forrest describes the flowers as rose or pale rose without markings.

3824 **Rhododendron monanthum**, Balf. f. et W. W. Sm.

Rh. sulfureum, Diels non Franch. in Notes, R.B.G., Edin., v (1912), 66.

Fruticulus ad 1 m. altus patens. Ramuli tenues annotini circ. 1.5 mm. diam. fusci epilosi rufo-lepidoti tandem (in anno quaterno) grisei decorticantes. Alabastrorum perulae annos plures persistentes ovatae oblongae dorso lepidotae margine pilis contortis longis ciliatae. Folia ad 4.5 cm. longa petiolata; lamina elliptica vel oblongo-elliptica vel oblonga ad 4 cm. longa 2.5 cm. lata coriacea apice obtusa abrupte vel subacuminatim corneo-mucronulata margine cartilaginea vix recurvata pedibus setarum delapsarum plus minusve notata basi obtusa vel late cuneata supra subnitida fulvo-viridis dense lepidota venarum reti elevato-reticulata costa media sulcata venis primariis utrinsecus circ. 10 subpatentibus squamarum peltatarum superficialium vestigiis verruculosa subtus olivacea (costa media elevata caeteroquin venarum reti immerso) squamis inaequalibus minoribus et majoribus discontiguis stipite longo umbone lato rufo resinoso convexo institaque integra lata praeditis ex foveolis orientibus atque papillis epidermicis ceriferis longis baculiformibus saepe curvatis notata; petiolus rufo-lepidotus ad 5 mm. longus. Flores solitarii terminales; bracteae paucae crustaceae fulvae late ovatae vel rotundatae apice submucronulatae extus minutissime et uniformiter puberulae apice albo-ciliatae; prophylla filiformia ramentacea brunnea ad 8 mm. longa; pedicellus

robustus ad 5 mm. longus dense lepidotus curvatus. Calyx circ. 2 mm. longus extus dense rufo-lepidotus fere obsoletus cupula margine obscure undulato-lobulata. Corolla lutea campanulata circ. 2.3 cm. longa extus lepidota intus basim versus paullo puberula lobis 5 cordatis vel late ovatis vel ellipticis circ. 8 mm. longis 1 cm. latis imbricatis emarginatis et subcrenulatis. Stamina 10 inaequalia longiora corollam subaequantia filamentis deorsum dilatatis supra basim villosulis antheris oblongis 4 mm. longis. Ovarium conoideum circ. 4 mm. longum dense luteo-lepidotum et pilis paucis conspersum; stylus ultra corollam ad 8 mm. exsertus glaber rectus vel paullo curvatus; stigma lobulatum.

Species *Rh. pachypodo*, Balf. f. et W. W. Sm. affinis foliis minoribus ellipticis indumento diverso calyce epiloso inter notas alias recedit.

Yunnan. Lupo Pass, Mekong-Salween Divide. Alt. 10,000–11,000 ft. Lat. 27° 10′ N. Small spreading shrub of 2–3 ft. Flowers, bright yellow. Shady situations on the margins of pine forests and cane brakes. G. Forrest. No. 951. Nov. 1905.

An interesting yellow-flowered species distinguished by its solitary terminal flower. Its nearest ally appears to be *Rh. pachypodum*, Balf. f. et W. W. Sm. Both of the species have remarkably thick pedicels and exceptionally long styles. Diels * referred this plant to *Rh. sulfureum*, Franch. It is not Franchet's species. Apart from the yellow flower-colour they seem to have little in common. See what I say on p. 283 under *Rh. theiochroum* about gaps in our knowledge of *Rh. sulfureum*.

The peltate scales of the indumentum in this species belong to the type with well-developed umbo and an entire fringe, its margin being quite smooth. I may give a warning here. Many parts of the plant, particularly the leaf-petiole and the stem, appear to be shortly pilose or puberulous—the hairs being black and often issuing from the umbo of the scales. This pilosity is due to a fungus. On the upper leaf-surface in the old leaves—I know nothing of the young leaves—the peltate scales persist and appear as little warts. They have short stalks and are not inserted in pits. On the under surface the scales are of many sizes, some very small, others large, and they have conspicuous stalks arising in pits and bringing the disk of the scale to the surface whence the broad fringe expands. The epidermal papillae are long and rod-like and are often curved. The wax-secretion is not enough to give a white colour to the leaf surface between the scales.

* Diels in Notes, R.B.G., Edin., v (1911), 66.

Rhododendron nwaiense, Balf. f. et Ward.

Frutex ad 1 m. altus in bambusetis et inter rupes crescens ramosissimus parvifolius. Ramuli juniores alabastrorum perulis externis annos plures persistentibus sordide griseis angustis elongato-triangularibus circ. 5 mm. longis carinatis acutis vel acuminatis coriaceis dorso obscure lepidotis margine eciliatis imbricatim obtecti seniores grisei verruculosi decorticantes. Alabastra oblongo-ovoidea acuta paucifolia perulis internis membranaceis subspathulatis obtusis apiculatis ciliatis. Folia crasse coriacea ad 2 cm. longa petiolata; lamina oblonga apice profunde emarginatim recurvata sinu corneo-mucronulato margine revoluta integra subasperata basi cordulata supra atro-viridis squamarum peltatarum juvenilium vestigiis conspersis asperata costa media sulcata caeteroquin venuloso-reticulata rugulosa subtus fusco-ferruginea squamis peltatis longi-stipitatis et brevistipitatis (illis disco lato praeditis stratum super has breviores angustiores facientibus) induta costa media elevata primo dense lepidota tandem fere nuda flavida. Flores sulfurei in umbellas circ. 6-floras parvas terminales rhachi puberula dispositi; bracteae late ovatae vel rotundatae apiculatae dorso lepidotae margine ciliatae intus puberulae circ. 5 mm. longae pedicellis longiores; prophylla lineari-claviformia ramentacea extus lepidota margine ciliata circ. 4.5 mm. longa calyce breviora; pedicelli ad 2 mm. longi lepidoti haud puberuli. Calyx fere ad basim in lobos 5 inaequales nunc aequales fissus cupula crateriformi dense lepidota lobis membranaceis viridibus vel rubidis extus dense lepidotis margine lepidoto-fimbriatis lobo antico minimo circ. 3 mm. longo oblongo-obtuso lobis postero-lateralibus saepe in lobum unum latum circ. 4.5 mm. longum apice dentatum connatis. Corollae tenuis obliquae 1.5 cm. longae tubus antice circ. 6.5 mm. longus extus glaber intus pubescens in lobos explanatos latiusculos circ. 5 mm. longos 7 mm. latos extus sparsim lepidotos crenulatos sursum ampliatus. Stamina 5 circ. 5 mm. longa filamentis glabris ad basim expansis, antheris oblongis. Ovarium conoideum 5-lobatum lepidotum circ. 1.5 mm. longum; stylus rectus haud clavatus ad 2 mm. longus ovario longior stigmate lobato coronatus,

Species *Rh. gymnomisco,* Balf. f. et Ward proxima alabastrorum perulis persistentibus, foliis saepe emarginatis, pedicellis epuberulis, corolla sulfurea, staminibus glabris, ovario lepidoto, stylo puberulo distinguenda.

E. Upper Burma. Ridge of Naung Chaung. Nwai Divide. Dwarf bushy shrub of 2–3 ft. amongst bamboo brake or in the open amongst granite boulders about 12,000–13,000 ft. Flowers sulphur yellow. *Cf.* very similar sp. from Doker La, M.S.

Divide. Not seen on M.Y. Divide. F. Kingdon Ward. No. 1791. 16th July 1914.

This plant is nearly allied to the more northern *Rh. gymnomiscum*, Balf. f. et Ward but the two plants are different. They belong to the Cephalanthum series but *Rh. gymnomiscum* diverges slightly from the typical form of the series in its indumentum which is more compact not so spongy as is usual in the series (in this resembling one other member of the series *Rh. chamaetortum*, Balf. f. et Ward). They agree in having a reddened calyx without marginal hairs but fringed with scales. The reddening of the calyx occurs also in *Rh. chamaetortum* where it is associated with a slightly ciliate margin but is not common in the Cephalanthum series. They agree also in having a style which is longer—only slightly—than the ovary and which does not show the marked clavate enlargement upwards to the stigma as in other species of the Cephalanthum series. In the general run of their other characters the species are well within the Cephalanthum limit, and they differ from one another in a way which marks their distinctness. The following are easily observed points by which *Rh. nwaiense* is diagnosed from its ally: leaves smaller, of a maximum length of 2 cm.—I should interpolate here that the material of neither of the species is abundant and of *Rh. nwaiense* in particular is rather scanty; the leaves may therefore be larger than the specimens available show—scale-leaves of the vegetative buds narrow-pointed and persistent, fertile bracts much smaller and narrower, bracteoles shorter than the calyx, pedicels lepidote, and corolla lobes outside sparingly lepidote.

Rh. nwaiense may be taken as the southern form of what appears in the north as *Rh. gymnomiscum*.

See also p. 316.

4010 **Rhododendron oresbium,** Balf. f. et Ward.

Suffruticosum parvifolium fastigiatum ramulis plurimis intertextis. Ramuli hornotini circ. 1 cm. longi 1 mm. diam. squamis peltatis intense brunneis verruculosi seniores nigri tandem desquamantes. Alabastrorum parvorum ovoideorum perulae paucae externae ovatae vel rotundatae extus rufo-lepidotae margine submembranaceae minute ciliatae internae oblongo-ellipticae obtusae extus ex toto lepidotae saepe cerasino-lepidotae minutissime ciliatae. Folia parva brevissime petiolata ad 7.5 mm. longa; lamina coriacea oblonga vel elliptica circ. 7 mm. longa 3.5 mm. lata apice rotundata emucronulata margine subplana basi rotundato-obtusa supra atro-viridis albido-furfuracea squamis contiguis persistentibus uniformibus lepidota (squama quaque e stipite pluricellulari umbone convexo flaccido

vix nitente institaque membranacea integra umbone latiore aedificata e foveola profunda oriente) subtus squamis ut supra constructis rufescenti-nitentibus profundius impressis umbone concavo discontiguis vestita ad intervalla esquamosa papillis epidermicis ceriferis quadratis subglauca costa media supra subsulcata subtus paullo elevata venulis caeteris occultis ; petiolus vix 0.5 mm. longus brunneo-lepidotus. Flores in umbellam 2-floram terminalem dispositi ; alabastra globosa bracteis mox deciduis externis parvis ovatis coriaceis extus lepidotis internis rotundatis cucullatis mucronulatis crustaceo-membranaceis extus lepidotis margine ciliatis ; pedicelli parvuli circ. 1 mm. longi dense lepidoti. Calyx fere ad basim quinquelobatus cupula parva extus lepidota lobis circ. 1.5 mm. longis aequalibus vel subaequalibus ovatis submembranaceis acutis vel obtusis extus plus minusve lepidotis margine saepe lepidotociliatis apice interdum pilis 1–2 longis terminatis. Corollae lilacinae circ. 1.1 cm. longae extus elepidotae tubus brevis circ. 2 mm. longus intus ad faucem brevissime puberulus, limbi discus concavus circ. 2 mm. latus, lobi rotundati vel oblongo-elliptici circ. 7 mm. longi et lati margine undulati apice rotundati. Stamina 9 (–10 ?) corollam fere aequantia filamentis validis supra basim intra faucem corollae floccoso-pubescentibus pallidis. Ovarium oblongum albido-lepidotum ; stylus purpureus basi puberulus staminibus brevior vel ea vix aequans ; stigma lobulatum.

Species fastigiata *Rh. impedito*, Balf. f. et W. W. Sm. affinis sed indumenti subfoliaris squamis fere contiguis stylo staminibus haud longiore distincta.

Tibeto-Yunnan frontier. Doker La. 13,000–15,000 ft. F. Kingdon Ward. No. 541. 1913.

Rh. oresbium is one of the Lapponicum series. It resembles *Rh. impeditum*, Balf. f. et W. W. Sm. and other species with discontiguous uniform scales on the leaf under-side and with elepidote corollas, but is distinguished from them all by its style, which is puberulous not glabrous at the base and is not longer than the stamens.

See also p. 300.

3815 **Rhododendron pachypodum,** Balf. f. et W. W. Sm.

Frutex ad 1.5 m. altus laxe ramosus. Rami hornotini tenues circ. 2 mm. diam. dense rufo-lepidoti epilosi breves. Alabastrorum anguste ovoideorum acutorum perulae externae ovato-acuminatae subcarinatae extus dense rufo-lepidotae internae oblongae angustae subtruncatae apiceque albo-ciliatae. Folia breviter petiolata ad 8 cm. longa epilosa ; lamina ad 7.5 cm. longa ad 3 cm. lata lanceolata vel oblanceolata coriacea

crassiuscula apice breviter acuminata margine leviter revoluta basi obtusa vel cuneata supra viridis costa media sulcata caeteroquin reticulata sparsim (juventute copiose) lepidota squamarum stipite in foveam immerso disco fere libero subtus glauca cerifera squamis plurimis nitenti-umbonatis integro-alatis discontiguis rufis ultra fovearum ora projectis paucis majoribus lepidota costa media nervisque primariis utrinsecus 7–9 elevatis pallidis papillis epidermicis petasiformibus; petiolus brevis vix 1 cm. longus rufo-lepidotus. Inflorescentia terminalis umbellata plerumque 3-flora; flores lutei singulo excepto mox decidui. Bracteae mox deciduae (non visae); pedicelli breves circ. 1.5 cm. longi robusti circ. 3 mm. diam. dense rufi-lepidoti sub calyce expansi. Calycis lobi 5 crassi rotundati lati nunc deltoidei circ. 2 mm. longi 4 mm. lati extus lepidoti plus minusve hirsuto-ciliati. Corolla anguste campanulata circ. 3.5 cm. longa extus lepidota intus puberula lobis 5 oblongis rotundatis circ. 1.5 cm. latis. Stamina 10 corolla inclusa in dimidio inferiore pubescentia. Ovarium dense rufo-lepidotum; stylus longissimus ad 5 cm. longus stamina longe superans persistens sub fructu plus minusve declinatus ex toto lepidotus vel infra lepidotus superne sparse pilosus; stigma lobatum. Capsula ovoidea ad apicem ramulorum solitaria recta rufo-lepidota circ. 1.5 cm. longa 0.75 cm. diam.

Species *Rh. melinantho*, Balf. f. et Ward, forsan affinis, foliis multo majoribus, pedicello crasso, stylo longissimo recedens.

Yunnan. Western flank of the Tali Range. Lat. 25° 40′ N. Alt. 9000–10,000 ft. Shrub of 2–5 ft. In fruit. Open stony pasture and amongst scrub. G. Forrest. No. 11,547. Aug. 1913.

Yunnan. Tali Range, side valleys. Lat. 25° 40′ N. Alt. 10,000 ft. Shrub of 2–4 ft. Flowers yellow. In open scrub. G. Forrest. No. 13,512. Aug. 1914.

A most distinct species of the series of lepidote Rhododendrons which have a conspicuous wax-coating on the under side of the leaves. Here the epidermal papillae upon the surface of which the wax-granules appear are rod-like and of some length. The lepidote indumentum is on the young leaves abundant on the upper leaf-surface, on the older leaves it may disappear altogether save for a few scales in the groove of the midrib. On the under side the scales are always conspicuous and some of them are larger than the others. Every scale arises in a pit. The pits are somewhat shallower on the upper surface, and those on the lower surface are never more in depth than a quarter of the leaf-thickness. The pits are lined with wax-papillae and the scale has a stout pedicel which is long enough to project the upper part of the scale disk outside the mouth of the pit, conse-

quently the periphery of the disk can grow out as a fringe resting upon the papillate epidermal cells of the adjacent lamina-surface. The fringe is entire, its cells united throughout their whole length and bounded on the outside by a firm regular wall. The umbo is often convex at maturity, and its red secretion gives a scintillating aspect to the leaf-surface. The scales of the pedicels and flower-parts are of the same type but they are not partially sunk in pits.

No other Chinese species with this indumentum has so large leaves as has *Rh. pachypodum*. The name is given in reference to the short and stout pedicel. There is another feature in the flower region deserving of mention. The umbel is few-flowered and apparently only one flower in the umbel sets seeds. On one twig I find two capsules, but usually there is a solitary capsule on the stout pedicel at the end of the flowering twig. The flowers available for examination are unfortunately withered, and the description given above may therefore require modification when better specimens are known. The most conspicuous feature in the flower is the long lepidote style which persists and in fruit is curved downwards from near the base. The style which induced the name *Rh. longistylum*, given by Rehder and Wilson to one of their species—perhaps a distant ally—is only 2.5–3 cm. long, just about half the length of that in our species.

Rh. pachypodum is a plant of the Tali Range, and might have been expected to occur amongst the collection of Delavay. But I can find nothing like it, and Mr. Forrest tells me it is a rare plant.

4824 **Rhododendron pagophilum,** Balf. f. et Ward.

Frutex virgultorum ad 2.5 m. altus ramis dense intertextis late patentibus. Ramuli hornotini glandulis rubris breviter stipitatis dense vestiti annotini purpurei circ. 3 mm. diam. glandulis eisdem quae ad annum quartum vel quintum persistunt praediti vetustiores sordido-grisei. Alabastrorum circ. 1 cm. longorum angustorum elongatorum acutorum perulae externae ovatae acutae ciliatae interiores oblongae vel subspathulatae apice rotundatae vel emarginatae extus pubescentes et glandulosae subviscidae margine pilis rufis simplicibus vel digitatim ramosis subglandulosis dense ciliatim vestitae. Folia parva petiolata ad 7 cm. longa ; lamina coriacea oblongo-elliptica vel obovata ad 5.5 cm. longa ad 3 cm. lata apice rotundata abrupte rigide apiculata margine anguste cartilaginea plana basi obtusa vel rotundata supra in juventute atro-viridis epilosa eglandulosa ad maturitatem glabra viridis nitens costa media sulcata venis primariis utrinsecus ad 12 immersis vix areolata, subtus pallidior

in juventute pilis plurimis caulifloris flavidis et rubris induta paucioribus stipitatis digitatim longe ramosis singulatim praedita maturitate costa media straminea elevata caeteroquin subglauca opaca plana venarum reticulo immerso suberubescente conspicuo notata papillis ceriferis epidermicis petasiformibus et pilis minutis caulifloris copiosis subtiliter granulosa hic et illic pilis stipitatis digitatim ramosis conspersa; petiolus ad 1.5 cm. longus atro-purpureus glandulis rubris breviter stipitatis plus minusve vestitus. Flores 3–4 in umbellam veram laxe dispositi rhachi inter bracteas pedicellosque pilis tortuosis simplicibus et digitatim ramosis rufis dense obtecta; bracteae ignotae; pedicelli ad 1.5 cm. longi atrorubentes stricti glandulosi glandulis rubris fere sessilibus sub calyce expansi. Calyx crassus parvus atrorubens circ. 2.5 mm. longus extus glandulosus ad medium in lobos 5 late triangulares glandulis rubris dorsalibus et marginalibus obsitos divisus. Corolla rosea basi intus varo magno dorsali notata infundibuliformis basi subangustata circ. 3 cm. longa extus eglandulosa epilosa intus basi sparsim puberula lobis 5 rotundatis emarginatis circ. 1.3 cm. longis 2.5 cm. latis. Stamina 10 inaequalia longiora corolla paullo breviora filamentis deorsum latioribus tenuiter puberulis. Ovarium conoideum 4.5 mm. longum nigrum (siccitate) glandulis rubris breviter stipitatis dense vestitum; stylus glaber corollam subaequans vel paullo superans; stigma lobulatum haud discoideum stylo paullo latius.

Species *Rh. panteumorpho*, Balf. f. et W. W. Sm. affinis, habitu, foliorum indumento, corolla rosea varo rubro maculata infundibuliformi basi subangustata valde distincta.

Tibeto - Yunnan frontier. Ka - gwr - pw glacier valley. 14,000 ft. Scrub plant forming dense interlacing tangles 5–8 ft. high. On shady slopes with Picea. Kingdon Ward. No. 437. June 1913. In Herb. Edin.

Tibeto-Yunnan frontier. Doker La. Boulder screes, forest. 16,000 ft. Kingdon Ward. No. 596. 28th June 1913. In Herb. Edin.

See what I say under *Rh. panteumorphum*, Balf. f. et W. W. Sm. *Rh. pagophilum* is a typical member of the group which includes *Rh. panteumorphum*.

Rhododendron panteumorphum, Balf. f. et W. W. Sm.

Rh. selense, Diels non Franch. in Notes, R.B.G., Edin., vii (1913), 295.

Frutex ad 1.2 m. altus. Rami annotini circ. 2.5 mm. diam. glandulis rubris globosis vel ellipsoideis fere sessilibus vestiti. Alabastrorum oblongorum angustorum circ. 4 mm. diam. perulae externae spadiceae ovato-rotundatae extus granulosae margine minute ciliolatae interiores elongatae subspathulatae membran-

aceae. Folia petiolata ad 10.5 cm. longa ; lamina oblongo-elliptica ad 9 cm. longa ad 5 cm. lata apice rotundata abrupte rigide apiculata apiculo ad 1.5 mm. longo margine plana tenuissime cartilaginea basi rotundata vel subcordulata supra atroviridis ad maturitatem glabra hic et illic pilorum juvenilium vestigiis aliquando notata costa media paullo elevata sulcataque venis primariis utrinsecus ad 15 impressis caeteroquin subtiliter areolata subtus pallidior olivacea opaca costa media erubescente prominula caeteroquin plana conspicue rubido-venulosa granulosa papillis ceriferis epidermicis petasiformibus pilisque minutis caulifloris flavidis vel rubris conspersis praedita ; petiolus validus ad 1.75 cm. longus glaber vel glandulis sparsis praeditus. Flores in umbellam vel racemo-umbellam ad 8-floram laxam dispositi rhachi circ. 5 mm. longa pilis longe stipitatis digitatim ramosis ramulis rubris tortuosis dense obtecta. Bracteae non visae. Pedicelli rubidi circ. 2 cm. longi glandulis rubris breviter stipitatis vestiti sub calyce expansi. Calyx crassus parvus 2.5 mm. longus ruber extus pedicello similis rubro-glandulosus in dentes 5 late triangulares extus margineque rubro-glandulosos ad medium fissus. Corolla lutea circ. 3 cm. longa a basi vere campanulata intus fundo puberula extus eglandulosa epilosa lobis 5 rotundatis circ. 1.2 cm. longis 1.5 cm. latis emarginatis. Stamina 10 inaequalia longiora vix corolla breviora filamentis deorsum latioribus et puberulis. Ovarium (siccitate) nigrum circ. 3.5 mm. longum glandulis rubris fere sessilibus (quasi in costa media cujusque carpelli tantum) sparsissime praeditum ; stylus glaber corollam paullo superans ; stigma parvum lobulatum stylo vix latius.

Species olim cum *Rh. selensi*, Franch. confusa a qua corolla lutea staminibusque puberulis satis differt ; *Rh. Wardii*, W. W. Sm. aliquantum affinis sed calyce parvo, filamentis puberulis, stylo eglanduloso divergens.

Yunnan. Marshy mountain meadows on the Mekong-Salween Divide north-west of Tsekou. Lat. 28° 5′ N. Alt. 11,000–12,000 ft. Shrub of 2–4 ft. Flowers yellow. Forrest. No. 5068. Sept. 1904. In Herb. Edin.

Yunnan. Père Monbeig. No. 12. In Herb. Kew.

Rh. panteumorphum is one of those Chinese Rhododendrons possessing medium-sized leaves of a more or less elliptic shape, sometimes oblong elliptic, approaching rounded, with rounded or cordulate base and with funnel-shaped flowers in loose trusses, the styles always glabrous. All of them give promise of being effective garden plants. The under surface of the leaves in all of them appears to casual observation to be glabrous, but in them, as in such Himalayan forms as *Rh. Thomsoni*, Hook. f. and *Rh. campylocarpum*, Hook. f., the under surface is studded

more or less with glands which are stalked and have clavate greasy summits sometimes branched, and these glands are coloured yellow or red. There are several such Chinese species in addition to *Rh. panteumorphum*; for instance, *Rh. pagophilum*, Balf. f. et Ward, *Rh. jucundum*, Balf. f. et W. W. Sm., *Rh. selense*, Franch. Some of them have been hitherto misnamed *Rh. Souliei*, Franch. That species is the centre of a series with open corolla and glandular style—easily recognised characters seen also in *Rh. puralbum*, Balf. f. et W. W. Sm., *Rh. Wardii*, W. W. Sm., *Rh. Williamsianum*, Rehder et Wilson.

Rh. panteumorphum is the plant named *Rh. selense*, Franch. in Plantae Forrestianae by Diels. It is not Franchet's species. Its fine yellow coroila readily distinguishes it.

Rhododendron platyphyllum, Balf. f. et W. W. Sm.

Rh. cephalanthum, Franch. var. *platyphyllum*, Franch. mss. ex Diels in Notes, R.B.G., Edin., v (1912), 211.

Frutex aromaticus ad 1.5 m. altus subdivaricatim et tortuose ramosus. Ramuli hornotini fulvi squamis longius et brevius stipitatis dense furfuraceo-lepidoti vetustiores primo squamis integris nigricantibus et squamarum decapitatarum stipitibus porriginosi quasi-setulosi deinde subscabridi grisei decorticantes alabastrorum perulis externis sublignosis annos plures persistentibus verticillatim inter se distantibus praediti. Alabastrorum oblongo-ovoideorum perulae externae circ. 8 mm. longae crustaceo-coriaceae late ovatae carinatae apiculatae dorso lepidotae margine setuloso-ciliatae interiores deciduae tenues membranaceae flavidae ovatae vel subspathulatae margine hirsuto-ciliatae extus lepidotae intus puberulae ad 2.5 cm. longae 1 cm. latae. Folia ad 5.5 cm. longa petiolata; lamina oblonga vel oblongo-elliptica vel elliptica ad 5 cm. longa 2.5 cm. lata coriacea apice obtusa saepe emarginatim recurvata corneo-mucronata (in juventute costa media longe excurrente) margine cartilaginea paullo revoluta obscure undulata vel minute crenulato-denticulata hirsuto-setulosa vel setarum pedibus punctulata basi obtusa supra olivacea glabrescens costa media sulcata venis primariis utrinsecus circ. 8 paullo sulcatis caeteroquin areolatim rugulosa squamarum juvenilium vestigiis obscure conspersa (in juventute atrorubens et squamis latis lepidota) subtus cinnamomea porriginosa costa media elevata straminea laxe lepidota venarum reti caeteroquin occulto indumenti squamis longe stipitatis disco spadiceo ex umbone institaque lata fimbriata aedificato stratum superius construentibus squamas brevi-stipitatas incoloratas obtegentibus; lamina juvenilis dense luteo-lepidota; petiolus circ. 5 mm. longus crassus lepidotus et quasi-setulosus. Flores lactei circ. 8 in umbellam veram termi-

nalem subcapitatim dispositi; bracteae steriles late ovatae acuminatim apiculatae ad 1 cm. longae extus lepidotae margine minute ciliatae intus puberulae fertiles obovatae vel obovato-spathulatae ad 1.2 cm. longae 6 mm. latae membranaceae extus lepidotae margine minutissime ciliatae deciduae; prophylla circ. 1 cm. longa membranacea calyce longiora clavi-formia circ. 1 mm. lata dorso lepidota margine minute ciliata; pedicelli circ. 4 mm. longi lepidoti epilosi. Calyx circ. 5 mm. longus poculiformis fere ad basim in lobos 5 subaequales erectos fissus cupula lepidota lobis membranaceis dorso lepidotis ad apicem pilis longis sparsissime praeditis. Corolla circ. 2 cm. longa tubo extus glabro intus dense villosulo sursum in limbum amplum obliquum 5-lobatum explanato lobis subaequalibus rotundatis circ. 1 cm. diam. crenulatis. Stamina 5 tubo corollino inclusa circ. 6 mm. longa filamentis deorsum dilatatis basim versus minutissime puberulis antheris oblongis circ. 1.5 mm. longis. Ovarium 1.5 mm. longum lobatum dense luteo-lepidotum; stylus viridis clavatus glaber ovarium aequans stigmate lobato coronatus.

Species *Rh. cephalantho*, Franch. valde affinis foliis latioribus ad 2.5 cm., perulis persistentibus late ovatis, prophyllis calyce longioribus ciliatis haud villosis, calyce breviore apice sparsim longe ciliato haud villoso, corollae tubo latiore breviore, limbo ampliato explanato, lobisque majoribus recedit.

Yunnan. Dry exposed ledges of cliffs on the eastern flank of the Tali Range. Alt. 10,000–11,000 ft. Lat. 25° 40′ N. Shrub of 2–5 ft. Flowers pure white. Foliage strongly aromatic. G. Forrest. No. 4155. Aug. 1906.

Yunnan. Tali Range. Alt. 10,000 ft. Lat. 25° 40′ N. Shrub of 3–4 ft. Flowers membranous creamy white, occasionally faintly flushed rose on exterior. On ledges of cliffs and in bamboo brakes. G. Forrest. No. 11,730. June 1913.

Yunnan. Tali Range. Lat. 25° 40′ N. G. Forrest. No. 13,526. July 1914.

Dr. Diels attached the name *Rh. cephalanthum*, Franch. var. *platyphyllum*, Franch. to Forrest's specimen No. 4155, and under the name the plant is recorded in Plantae Forrestianae.* There has been no other publication of the name, to my knowledge. From Dr. Diels it has been learned that he found the name written by Franchet on a sheet in the Paris Herbarium and adopted it, as he did in several other like instances. From the facts one may conclude that Franchet intended to mark the plant as different from *Rh. cephalanthum*, Franch., but circumstances did not permit of his making critical examination of it,

* Notes, R.B.G., Edin., v (1911), 211.

and he published no description. Had he been able to do so he would have seen that the differences which analysis brings out are pronouncedly specific.

Rh. platyphyllum finds undoubtedly its nearest ally in *Rh. cephalanthum*, and if the size of its leaves is the most evident difference between the two species it is supported by many other differential characters which are not difficult to observe. *Rh. cephalanthum* is one of the species of small-leaved Rhododendrons which retain for several years the outer leaf-bud scale-leaves. These cover more or less the branches and are sharp-pointed with prominent dorsal rib, showing the remains of the indumentum and marginal hairs that coated them at an earlier period. In *Rh. platyphyllum* we have the same persistence of leaf-bud scale-leaves, but the scale-leaves are broadly ovate or rounded with or without a keel and only apiculate. In the young condition the difference between the scale-leaves is extremely marked. Whilst those of *Rh. cephalanthum* have shaggy margins those of *Rh. platyphyllum* are minutely ciliate. The bracteoles (prophylla) are diagnostic. In *Rh. cephalanthum* they are shorter and broader, reaching only about half way up the calyx; in *Rh. platyphyllum* they exceed in length the calyx. The flowers of the two species are no less different. *Rh. cephalanthum* has a campanulate slightly patent calyx which is some 8 mm. long about one-third the length of the corolla, its lobes are shaggy, often erose, the corolla has a long tube, and the lobes are only about 5 mm. broad more or less erecto-patent; whilst in *Rh. platyphyllum* the calyx is cup-shaped with lobes about 5 mm. long about one-quarter the length of the corolla, and these which may also be erose have only a few longish hairs at the top; the corolla has a short tube with lobes about 1 cm. long which apparently are flat or even repand.

See also p. 316.

4877 **Rhododendron praeclarum,** Balf. f. et Farrer.

Fruticulus parvus decumbens divaricatus ramosissimus. Ramuli annotini circ. 1 mm. diam. dense fusco-lepidoti vetustiores squamarum vestigiis sordidis vestiti tandem cinerei decorticantes corticem interiorem flavido-cinereum detegentes. Alabastrorum ovoideorum parvorum obtusorum perulae mox deciduae externae rotundatae spadiceo-brunneae paucae subcarinatae circ. 5 mm. longae dorso lepidotae minutissime albo-ciliolatae interiores fuscae spathulatae obtusae ad 6 mm. latae squamis paucis latis dorso lepidotae apicem versus minute puberulae margine longe ciliatae. Folia crasse coriacea petiolata ad 2.5 cm. longa; lamina elliptica vel oblongo-elliptica circ. 2 cm. longa 1 cm. lata apice obtusa mucrone longo terminata

margine vix revoluta integra subasperata basi obtusa vel late cuneata vel subrotundata supra atro-viridis squamarum juvenilium citrinarum vestigiis conspersis obscure pulverulenta costa media sulcata caeteroquin reticulatim rugulosa subtus cinnamomea indumento squamarum peltatarum longius stipitatarum discis latis in stratum sublaxum uniforme superficiale squamas breviter stipitatas obtegens dispositarum induta costa media primo omnino lepidota deinde subnuda (lamina juvenilis utr nque citrino-lepidota eciliata margine squamulis asperata) ; petiolus circ. 4 mm. longus cinnamomeus lepidotus. Flores in umbellas capituliformes terminales ad 8-floras congesti ; bracteae exteriores rotundatae circ. 5 mm. diam. ecarinatae crassae extus densissime lepidotae ala angusta submembranacea limbatae margine minutissime ciliolatae interiores coriaceae haud membranaceae spadiceo-brunneae late spathulatae ad 7 mm. longae 4 mm. latae dorso medio virides lepidotae margine ciliatae ; prophylla lineari-claviformia ramentacea puberula dorso apicem versus sparsim lepidota margine ciliata calycem aequantia ad 6 mm. longa ; pedicelli circ. 1.5 mm. longi lepidoti. Calyx poculiformis ad 4 mm. longus ultra medium fissus extus dense lepidotus viridis lobis membranaceis subaequalibus oblongis acutis vel obtusis intus glabris margine apiceque lepidoto-fimbriatis eciliatis. Corollae paullo obliquae elepidotae circ. 1.4 cm. longae tubus antice circ. 8 mm. longus extus glaber intus plus minusve villosulus in limbum latum 5-lobatum expansus lobis subellipticis subaequalibus circ. 5 mm. latis crenulatis. Stamina brevia circ. 4 mm. longa filamentis deorsum paullo dilatatis glabris antheris rufis oblongis 1 mm. longis. Ovarium circ. 1.5 mm. longum ovoideum lobatum lepidotum ; stylus ovario paullo brevior clavatus flavidus stigmate lobato coronatus.

Species nova *Rh. cephalantho*, Franch. affinis foliorum indumento minus laxo, floribus flavis, prophyllis calycem aequantibus, inflorescentiae rhachi puberula, pedicellis lepidotis brevibus, calycis lobis viridibus lepidotis margine lepidoto-fimbriatis, corolla glabra, staminum filamentis glabris, stylo quam ovarium breviore notata.

Kansu. A decumbent straggling little plant on cool rock surfaces and mossy banks about beck-gullies high up on the Thundercrown Range, but not common till you get to Lotus Mountain and the main Min San. Farrer. F. 88. 20th June 1915.

I expected this plant coming from Kansu would prove to be *Rh. anthopogonoides*, Maxim. which was collected by Przewalski in 1872, but Mr. Farrer's plant is very different. It has smaller leaves and their indumentum is much more that of the

Cephalanthum series, and yet it is not so loose and spongy as is typical there. The broad disks of the scales are very beautifully seen in this new species. The colour of the indumentum is darker (on the way to rufescent) than in any other species of the series. The flowers are bright yellow as they are in *Rh. gymnomiscum*, Balf. f. et Ward, *Rh. nwaiense*, Balf. f. et Ward and in *Rh. Sargentianum*, Rehder et Wilson of the series. The large leathery bracts with broad soft scales on the back are characteristic, and it is one of the species that has a puberulous rhachis to the inflorescence and lepidote short pedicels. The calyx is distinctive from most species of the series the lobes having a lepidote margin. The stamens have glabrous filaments, and the style is shorter than the ovary.

I hope Mr. Farrer has introduced to cultivation this beautiful little species.

See also p. 316.

4878 **Rhododendron praestans,** Balf. f. et W. W. Sm.

Frutex grandifolius ad 9 m. altus ramis ultimis crassis. Ramuli juveniles circ. 7.5 mm. diam. albidi laeves indumenti strato nitente obtecti vetustiores indumenti vestigiis conspersi. Alabastra ignota. Folia magna petiolata ad 35 cm. longa; lamina crasse coriacea longe cuneata a regione latissima prope apicem deorsum attenuata apice rotundata margine cartilaginea vix revoluta basi stricte cuneata supra viridis glabra costa media lata venisque primariis utrinsecus circ. 13 sulcatis subtus albida nitens costa media venisque primariis elevatis reticulo ultimo occulto ubique strato compacto crustiformi tenui uniformi persistente ex pilis floccoso-ramosis pede colorato brevissimo ramulisque latis longis unicellularibus vacuis vesiculosis intertextis aedificato vestita; petiolus crassus circ. 2 cm. longus indumento albido obtectus mox glabrescens. Flores laxe racemoso-umbellati, inflorescentiae circ. 12-florae, rhachis circ. 4 cm. longa plus minusve rubiginoso-tomentosa. Bracteae fertiles ligulatae vel subspathulatae extus glabrae intus tomentosae; pedicelli circ. 5 cm. longi rubiginoso-tomentosi ad apicem sub calyce oblique expansi. Calyx parvus plus minusve tomentosus lobis inaequalibus deltoideis vel subrotundatis circ. 2 mm. longis. Corolla carnosula circ. 4 cm. longa late campanulata tubo circ. 3 cm. longo basi gibboso lobis 8 rotundatis emarginatis circ. 1 cm. longis 1.5 cm. latis. Stamina 16? inclusa filamentis glabris. Ovarium oblongum dense fasciatim ochraceo-tomentosum eglandulosum; stylus corolla brevior. Capsula vix curvata circ. 4 cm. longa 1 cm. lata rubiginoso-tomentosa. Semina oblonga complanata ala angusta arillata circ. 2.5 mm. longa pallide straminea.

Species *Rh. sino-grandi*, Balf. f. et W. W. Sm. proxima foliis longe cuneatis breviterque petiolatis, pedicellis longioribus tenuioribus minus tomentosis distincta.

Yunnan. Kari Pass. Mekong - Yangtze Divide. Lat. 27° 40′ N. Alt. 13,000 ft. Shrub of 20–30 ft. Flower ? In rhododendron forests. Forrest. No. 13,023. Aug. 1914.

A large-leaved species, of which we hope to learn more from cultivated plants than is possible from the two specimens collected by Mr. Forrest, one with ripe fruits, the other passing into fruit and with withered flowers. It is a species of the Grande group, having the characteristically veined leaves with white indumentum of floccose interwoven hairs forming a shining crust-like coating on their under side. The long cuneate leaves separate it from its Chinese ally *Rh. sino-grande*, Balf. f. et W. W. Sm., as also from the two Indian species of the group, the Nepal, Sikkim, and Bhutan *Rh. grande*, Wight, and the Manipur *Rh. Macabeanum*, Watt. *Rh. grande* is a wonderfully constant type in form of leaf—long oblong leaves always widest at the middle. *Rh. Macabeanum* has wider leaves than *Rh. grande* and they may become somewhat rotund but seem to be always widest at the middle. *Rh. sino-grande* also is consistent with this type, only in one large leaf have I seen the tendency to obovate showing. Here in *Rh. praestans*, Balf. f. et W. W. Sm. the leaves are always widest close to the apex and then taper gradually and regularly in cuneate fashion to the base. The inflorescence is much less compact than in *Rh. sino-grande*, the rhachis is longer, the pedicels thinner, and they as well as the calyx are much less tomentose than in *Rh. sino-grande*.

The corolla in our specimens is much shrivelled and is attacked by an Ascomycete which has formed its small round black fructifications all over the surface. These in the dried state shrink from their summit into cup-like disks extremely like, and at first glance to be mistaken for, the scales which appear so abundantly on the corollas of many species of Rhododendron, making them quite lepidote. The disease is one affecting many species of Rhododendron.

Rh. praestans may be regarded as the northern representative in Yunnan of the southern *Rh. sino-grande*.

4879 **Rhododendron proteoides,** Balf. f. et W. W. Sm.

Fruticulus robustus ad 1 m. altus subdichotome et tortuose ramosus. Ramuli crassi internodis brevissimis, foliis perulisque alabastrorum annos 3–4 persistentibus ex toto dense vestiti deinde illorum vestigiis per annos plurimos obtecti tandem decorticantes. Alabastrorum perulae persistentes exteriores late ovatae apiculatae extus margineque plus minusve rufo-

lanatae interiores ramentaceae brevissime petiolatae lanceolatae margine rufo-lanatae. Folia circ. 4.5 cm. longa crassissime coriacea petiolata ; lamina oblonga ad 4 cm. longa ad 1 cm. lata apice obtusa (costa media in tuberculum corneum apice revoluto occultum excurrente) margine admodum revoluta basi paullo attenuata supra laete viridis costa media venisque primariis utrinsecus circ. 10 sulcatis areolatim rugulosa glabrescens sed pilorum juvenilium stipitibus conspersa subtus indumenti lanati rufi persistentis strato 1–2 mm. crasso ex toto obtecta indumenti pilis robuste breviterque stipitatis apice in filamenta contorta intricatim intertexta copiose ramosis costam mediam elevatam omnino obtegentibus ; petiolus crassus latus usque ad 5 mm. circ. 5 mm. longus indumenti rufi strato ad 2 mm. diam. tunicatus. Flores in umbellas 8-floras terminales aggregati ; bracteae exteriores persistentes crustaceae late ovatae vel rotundatae carinatae plus minusve apiculatae vel subacuminatae dorso margineque subluteae fusco-lanatae fertiles citrinae deciduae subspathulatae ad 2 cm. longae extus intusque fusco-sericeae ; prophylla ramentacea citrina pubescentia anguste ligulato-claviformia circ. 1 cm. longa pedicellum aequantia ; pedicelli crassi circ. 1 cm. longi (sub fructu ad 1.5 cm.) tunica lanuginosa 1 mm. crassa pallide lateritia obtecti. Calyx atro-purpureus fere obsoletus circ. 1.5 mm. longus cupula extus glabrescente vel puberula lobis deltoideis vel sublunatis vel subrotundatis apice margineque longe pilosis. Corolla citrina coccineo-maculata infundibuliformis circ. 2 cm. longa tubo extus glabro intus basi obscure puberulo sursum in limbum 5-lobatum expanso lobis inaequalibus posticis rotundatis circ. 8 mm. longis 1.2 cm. latis emarginatis subcrenulatis. Stamina 10 inaequalia corollae tubum subaequantia filamentis deorsum dilatatis a basi ad medium minute puberulis, antheris parvis circ. 1 mm. longis. Ovarium pilis longis fasciatim ramosis pallide lateritiis glandulisque claviformibus brevioribus vestitum circ. 2.5 mm. longum ; stylus glaber tenuis staminibus longior corolla brevior apicem versus dilatatus stigmate lobulato coronatus. Capsula nigra vel atro-rubens tomento lanato detersili plus minusve obtecta basi calyce aucto ad 3 mm. longo lobis rubris late ovatis inclusa circ. 1 cm. longa 5 mm. lata. Semina oblonga longitudinaliter striata circ. 1.5 mm. longa straminea ecarunculata.

Species bene distincta *Rh. Roxieano*, G. Forrest affinis sed foliis brevibus obtusis et floribus citrinis facile recognoscenda.

Yunnan. Mekong-Salween Divide. Alt. 12,000–13,000 ft. Lat. 28° 14′ N. Shrub of 2–3 ft. Flowers pale canary yellow, with crimson markings. Open situations amongst boulders and

on ledges of cliffs. G. Forrest. No. 13,348. Sept. 1915; in fruit. No. 13,470. Oct. 1914.

One of the most striking species in Forrest's collection. The thick coriaceous leaves with the dense coating of bright rufous indumentum tells of a dry environment. The leaves are so much reflexed at the margin that only a narrow strip of the under-leaf surface covered with the rufous wool is visible. The hairs of the indumentum are much contorted and interwoven, and come off in bunches from a thick pedicel which swells up into a knob whence the branches take origin. The hairs easily separate from the stalk. The same kind of indumentum is seen in *Rh. Roxieana*, G. Forrest, the nearest ally of our plant, and there too the leaf margins are much reflexed, but the blunt rounded leaf apices of *Rh. proteoides* diagnose it readily. *Rh. proteoides* is said to have canary-coloured flowers, and for this should be in cultivation a more desirable plant than *Rh. Roxieanum*, which has whitish and rose flowers.

4880 **Rhododendron puralbum,** Balf. f. et W. W. Sm.

Frutex virgatus ad 4.5 m. altus. Ramuli hornotini glabri annotini virides ad 3 mm. lati vetustiores grisei. Alabastrorum parvorum circ. 8 mm. longorum oblongorum perulae intermediae firmae late ovatae apiculatae glabrae margine minutissime ciliolatae. Folia longe petiolata ad 9 cm. longa; lamina chartacea ad 7.5 cm. longa ad 4 cm. lata anguste oblongo-ovata apice subacuta rigide mucronata margine anguste cartilaginea plana basi truncata nec cordata supra in juventute pilis floccosis vel stipitatis et digitatim ramosis sparsim conspersa maturitate atro-viridis glabra saepe vestigia pilorum juvenilium exhibens obscure areolata costa media leviter sulcata venis primariis utrinsecus ad 9 impressis subtus ab initio pilis minutis brevissimis caulifloris albis vel flavido-rubris praedita pallidior opaca costa media ad basim elevata caeteroquin laevis venarum reti ultimo rubro-tincto conspicuo epidermide in papillas globosas excreta; petiolus ad 2.5 cm. longus eglandulosus rubro-viridis. Flores in umbellam 8-floram terminalem dispositi. Alabastra florum ignota. Pedicelli rigidi circ. 4 cm. longi glabri vel glandulis rubris parvis fere sessilibus paucis conspersi sub calyce paullo expansi. Calyx muscoso-viridis ad 8.5 mm. longus 5-lobatus basi cupuliformis glandulis rubris brevissime stipitatis paucis conspersus lobis membranaceis venulosis inaequalibus maximis circ. 6 mm. longis 5 mm. latis rotundatis vel oblongo-rotundatis margine glanduloso-ciliatis dorso basi nunc glandulosis. Corolla alba a basi late pateriformis circ. 4 cm. longa extus elepidota epilosa intus glabra lobis 5 brevibus circ. 1.5 cm. longis 3 cm. latis rotundatis undulatis subemarginatis. Stamina

10–12 inaequalia parte integra corollae breviora filamentis deorsum latioribus et minutissime puberulis antheris latis 2.5 mm. longis. Ovarium (in siccitate) nigrum conoideum circ. 4 mm. longum glandulis rubris elevatis breviter stipitatis obtectum; stylus corolla triente brevior staminibus longior ex toto rubro-glandulosus; stigma parvum lobulatum.

Species *Rh. Souliei*, Franch. affinis, foliis chartaceis non coriaceis anguste oblongo-ovatis nunquam cordatis, papillis epidermicis ceriferis globosis, petiolis eglandulosis, corolla alba pura, staminum filamentis minutissime puberulis diversa; *Rhododendro Wardii*, W. W. Sm. etiam similis sed foliis oblongo-ovatis non cordulatis apice subacutis, papillis epidermicis, corolla puralba recedens.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 11,000 ft. Shrub of 12–15 ft. Flowers pure white. In rhododendron and mixed scrub. Forrest. No. 10,616. July 1913.

Yunnan. Mountains west of Fengkow. Lat. 27° 40′ N. Alt. 14,000 ft. Flowers pure white. Forrest. No. 12,698. June 1914.

This charming species should be a valuable horticultural acquisition. It is a much larger plant than its allies *Rh. Souliei*, Franch. and *Rh. Wardii*, W. W. Sm. We have seedlings.

Rhododendron pycnocladum, Balf. f. et W. W. Sm.

Suffrutex parvifolius nanus patens ad 1 m. altus ramosissimus ramulis brevibus lignosis. Ramuli annotini circ. 1–2 cm. longi 1.25 mm. diam. squamis peltatis ferrugineis dense porriginosi seniores sordide grisei mox decorticantes. Alabastrorum parvorum circ. 3.5 mm. longorum oblongo-ovoideorum perulae paucae exteriores ovatae extus ferrugineo-lepidotae interiores subspathulatae vel rotundatae cucullatae subalbidae dorso rufo-lepidotae margine lanato-ciliatae. Folia petiolata crasse coriacea ad 1.2 cm. longa; lamina elliptica vel oblongo-elliptica circ. ad 1 cm. longa ad 6 mm. lata apice rotundata mucrone decurvo terminata margine leviter revoluta basi obtusa vel late cuneata vel subrotundata supra atro-viridis canescens squamis peltatis fere contiguis persistentibus uniformibus induta (squamarum institia albida umbone plus minusve luteo-nitente) subtus laete brunnea punctata squamis peltatis biformibus contiguis persistentibus plerisque adpressis umbone depresso resinoso-nitido institaque albida paucis majoribus conspersis longius stipitatis umbone institaque brunneis obtecta; petiolus circ. 2 mm. longus squamis furfuraceus. Flores haud fragrantes solitarii terminales. Alabastra globosa bracteis rotundatis cucullatis extus lepidotis margine ciliatis. Pedicelli breves lepidoti

vix 1.5 mm. longi. Calyx circ. 3.5 mm. longus fere ad basim 5-lobatus lobis oblongis aequalibus vel inaequalibus obtusis viridibus vel rubro-purpureis dorso margineque lepidotis ciliatis vel eciliatis. Corollae caesiae circ. 1 cm. longae extus lepidotae tubus latus poculiformis basi subventricosus circ. 2 mm. longus ad faucem albo-villosus in limbum ampliatum patenter expansus disco circ. 2 mm. lato lobis oblongis undulatis circ. 6 mm. longis. Stamina 10 corolla breviora filamentis pallide purpureis supra basim ad faucem corollae albovillosis. Ovarium pallide viride canescenti-lepidotum; stylus glaber purpureus corolla staminibusque longior; stigma lobulatum. Capsula circ. 5 mm. longa calyce aucto inclusa 5-valvata.

Species fastigiata foliis ellipticis supra atro-viridibus subtus brunneis squamis contiguis biformibus praeditis, corolla extus lepidota distinguenda.

Yunnan. Dry ledges and clefts of limestone cliffs on the eastern flank of the Lichiang Range. Lat. 27° 10′ N. Alt. 10,000–11,000 ft. Spreading dwarf shrub of 2–3 ft. Flowers blue lavender, base of corolla white, non-fragrant. Forrest. No. 2181. May 1906.

Yunnan. On ledges of limestone cliffs and humus-covered boulders. Eastern flank of the Lichiang Range. Alt. 11,000 ft. Lat. 27° 30′ N. Shrub of ½–3½ ft. Flowers purplish blue. Forrest. No. 5879. June 1910.

This species is very distinct within the Lapponicum series of Rhododendrons. Its short-twigged growth gives it a habit distinct from *Rh. diacritum*, Balf. f. et W. W. Sm., *Rh. drumonium*, Balf. f. et Ward, and *Rh. telmateium*, Balf. f. et W. W. Sm., with which by technical characters of indumentum and flower it may be associated. It is like these, one of a small group of Rhododendrons which have contiguous bicolour punctulate scales on the under-leaf surface which is here bright brown in tint.

See also p. 300.

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Rhododendron radinum, Balf. f. et W. W. Sm.

Fruticulus nanus ravus ad 6 dm. altus parvifolius copiose ramosus. Ramuli hornotini circ. 1 mm. diam. squamulis longe stipitatis flavido-albidis porriginosi annotini griseo-fulvi stipitibus albidis squamarum decapitatarum setuloso-hirsuti tandem grisei decorticantes. Alabastrorum elongato-ovoideorum perulae persistentes externae angustae a basi lanceolatae acutae vel acuminatae carinatae extus lepidotae margine ciliatae circ. 3 mm. longae 1 mm. latae interiores membranaceae ligulatae ad 6 mm. longae 1 mm. latae longe ciliatae. Folia angusta ad 2.4 cm. longa petiolata; lamina lineari-lanceolata vel oblanceolata ad 2 cm.

longa ad 5 mm. lata apice obtusa mucronulata margine revoluta basi gradatim in petiolum brevem ad 4 mm. longum lepidotum attenuata, supra atro-viridis squamis siccis umbone citrino institaque fimbriata albida plus minusve pulverulentim obtecta quasi subasperata costa media subsulcata caeteroquin reticulo occulto, subtus pallide alutacea subspongiosa squamis contiguis inaequaliter stipitatis porriginosa plurimis longioribus umbone institaque latis stratum superius facientibus caeteris pallidioribus in stratum inferius dispositis costa media prominula. Flores roseo-albi in umbellas parvas multifloras breviter racemose capituliformes terminales rhachi puberula congesti inter ramulos hornotinos subflorales praecoces immersi; bracteae externae coriaceae fulvae ovatae subacuminatae extus lepidotae margine ciliatae intus glabrae interiores subrotundatae ad 4 mm. longae subcoriaceae cucullatae extus lepidotae margine ciliatae; prophylla spathulata ramentacea circ. 3 mm. longa calycem subaequantia uninervia subcarinata 3 mm. longa 1 mm. lata extus lepidota margine ciliata; pedicelli subnulli. Calyx viridis parvus circ. 2 mm. longus irregulariter fere ad basim vel ad medium 5-fissus lobis inaequalibus subquadratis membranaceis extus lepidotis margine ciliatis intus glabris. Corollae carnosulae extus lepidotae circ. 1 cm. longae tubus obliquus brevis circ. 6 mm. longus intus sparsim pubescens, lobi 5 rotundati explanati circ. 3 mm. longi imbricati paullo crenulati. Stamina 5 inclusa filamentis deorsum dilatatis glabris, antheris rufescentibus oblongis 0.5 mm. longis. Ovarium ovoideum 2 mm. longum 5-lobatum squamis albidis parvis contiguis lepidotum; stylus vix 0.5 mm. longus clavatus stigmate 5-lobato albido coronatus.

Species tenuifolia ex affinitate *Rh. cephalanthi*, Franch. partibus omnibus minoribus diversa.

Yunnan. Lichiang Range. Alt. 11,000–12,000 ft. Lat. 27° 30′ N. Dwarf shrub of 1–2 ft. Flowers white flushed rose. Open alpine pasture on the margins of pine forests. G. Forrest. No. 10,278. June 1913.

Rh. radinum, Balf. f. et W. W. Sm. is an easily recognised species of the Cephalanthum series. It is one of the narrow-leaved members of the series, resembling particularly forms of *Rh. ledoides*, Balf. f. et W. W. Sm. and *Rh. sphaeranthum*, Balf. f. et W. W. Sm. From the former its pointed persistent foliage-bud scale-leaves, nearly sessile flowers, lepidote corolla, glabrous stamens, and style much shorter than the ovary distinguish it. From the latter its foliage-bud scale-leaves are a distinctive mark as well as its short inner bracts and short prophylls, puberulous pedicels, sessile flowers, and glabrous filaments to the stamens.

See also p. 316.

3949 **Rhododendron ravum,** Balf. f. et W. W. Sm.

Frutex ad 3.5 m. altus ramis strictis erectis infra efoliatis. Rami juveniles circ. 3 mm. diam. stratis duobus squamarum peltatarum dense porriginosi substrati albidi squamis adpressis superstrati paucioribus pallide brunneis stipitatis extrusis, in anno secundo saepe rubescentes, in tertio cinerei cortice desquamante. Alabastrorum ovoideorum perulae exteriores ovatae acuminatae ciliatae interiores latae rotundatae carinatae breviter acuminatae vel truncatae et mucronulatae extus lepidotae intus plus minusve sericeae, intimae ligulatae membranaceae apice expansae extus lepidotae margine pilis longis patentibus ciliato-fimbriatae. Folia petiolata ; lamina ad 7 cm. longa ad 2.5 cm. lata oblonga vel oblongo-elliptica apice obtusa distincte mucronata margine cartilaginea leviter crenulata pilis contortis paucis (mox deciduis) praesertim basim late cuneatam versus obsita, pagina superiore atro-viridi squamis peltatis argenteis contiguis uniformibus obtecta, inferiore opertu denso nitente squamarum imbricatarum uniformium primo argentearum demum ochracearum occulta, costa media supra sulcata subtus prominula squamis laxioribus vestita venis primariis utrinque occultis ; petiolus ad 1.5 cm. longus plerumque brevior dense lepidotus nonnunquam pilos contortos paucos gerens. Umbella terminalis 3–4-flora ; bracteae dense pubescentes ; pedicelli validi circ. 6 mm. longi sub calyce lepidoti ; prophylla filiformia pedicellos aequantia. Calyx circ. 9 mm. longus basi cupularis lobis 5 aequalibus vel subaequalibus circ. 7 mm. longis (sub fructu ad 1 cm. accrescentibus) 4 mm. latis membranaceis ligulatis viridibus conspicue carinatis extus lepidotis margine pilis longis circumcirca ciliatis. Corolla extus lepidota circ. 2.5 cm. longa profunde fissa tubo circ. 8 mm. longo cylindrico basi 5-gibboso extus puberulo intus pubescente limbi disco ampliato tubum aequante lobis 5 circ. 1·3 cm. longis 1 cm. latis oblongis subacutis. Stamina 10 subaequalia corolla longiora circ. 3 cm. longa filamentis supra basim dense villosis. Ovarium parvum circ. 3.5 mm. longum viride dense lepidotum ; stylus circ. 3 cm. longus basi pilosus stamina subaequans. Capsula nigra recta albido-lepidota circ. 1.4 cm. longa 4 mm. lata (matura ?) basi calyce adpresso inclusa.

Species *Rh. hippophaeoidi,* Balf. f. et W. W. Sm. forsan affinis sed major et ramulorum squamulis biformibus, laminae margine petioloque pilis longis obsitis, calycis lobis majoribus circumcirca ciliatis, corolla extus lepidota intus villosiore, staminibus longis villosioribus, stylo basi piloso diversa.

Yunnan. Mountains in the N.E. of the Yangtze bend. Lat. 27° 45′ N. Alt. 11,000 ft. Shrub of 4–12 ft. Open thicket. G. Forrest. No. 10,423. July 1913.

A species perhaps allied to *Rh. hippophaeoides,* Balf. f. et

W. W. Sm. but altogether a larger plant with larger leaves. It differs in the indumentum of the twigs, which has biform scales, in the long hairs on the leaf margin—early caducous—and on the petiole, in the larger calyx with membranous lobes and fringed all round with long hairs, in the larger corolla more villous inside and lepidote outside, in the very long stamens with most villous filaments, in the style pilose at base.

There may be some modification needed in the flower description, as all the flowers on the specimen are shrivelled.

3987 **Rhododendron scintillans,** Balf. f. et W. W. Sm.

Suffrutex ad 1 m. altus copiose ramosus ramulis intricatis et virgatis. Ramuli hornotini circ. 1.5 mm. diam. squamis peltatis dense fusco-lepidoti annotini fere esquamosi seniores grisei decorticantes. Alabastrorum parvulorum oblongorum perulae paucae fusco-lepidotae. Folia petiolata ad 1.8 cm. longa; lamina crasse coriacea ad 1.5 cm. longa ad 5 mm. lata lanceolata vel anguste oblonga extremitates versus angustata apice obtusa vel subacuta mucronata margine leviter revoluta basi in petiolum brevem fusco-lepidotum vix 3 mm. longum attenuata supra atro-viridis squamis umbonatis persistentibus uniformibus instita albida cinctis superficialibus discontiguis umbone plerumque secretione resinosa impleto flavescente scintillante subtus pallide rufescenti-cinnamomea et virescens squamis peltatis discontiguis uniformibus persistentibus rufescentibus nitentibus impressis induta intervallis esquamosis pallide viridibus opacis papillis epidermicis ceriferis obtectis. Flores in umbellas 2-floras terminales dispositi; alabastra florum globosa; bracteae steriles rotundatae cucullatae dorso lepidotae margine fimbriato-ciliatae; pedicelli vix 1 mm. longi dense lepidoti. Calyx circ. 3.5 mm. longus vel longior tubo corollae vix brevior fere ad basim 5-lobatus lobis oblongis vel ovatis subacutis purpureis elepidotis margine longe ciliatis. Corollae purpureae extus elepidotae tubus circ. 2 mm. longus intus ad faucem villosus, limbi discus circ. 1.2 mm. latus, lobi ad 8 mm. longi oblongi vel rotundati obtusi crenati. Stamina 10 corollam aequantia filamentis basi latioribus supra ovarium villosis. Ovarium purpureum lepidotum; stylus glaber purpureus staminibus longior; stigma lobulatum.

Species fastigiata *Rh. fastigiato,* Franch. affinis, foliorum pagina inferiore haud glauca, inflorescentia 2–3-flora, corolla extus elepidota separata.

Yunnan. Summit of the Langkong-Hoching Pass. Lat. 26° 20′ N. Alt. 11,000 ft. Shrub of 2–3 ft. Flowers lavender purplish blue. Open marshy pasture. G. Forrest. Nos. 10,014, 10,015. May 1913.

Yunnan. Lichiang Range. Lat. 27° 30′ N. Alt. 11,000–14,000 ft. Dwarf cushion shrub of 1–2 ft. Flowers purple blue. Open pastures and on cliffs. G. Forrest. No. 10,035. May–June 1913.

This plant has a strong likeness to *Rh. fastigiatum*, Franch. It is one of the longer-leaved species amongst the Lapponicum Rhododendrons, and the leaves taper to both ends. Amongst the purple-flowered species with discontiguous scales on the under side of the leaf its nearest ally seems to be *Rh. impeditum*, Balf. f. et W. W. Sm., but that plant has elliptic leaves with the upper surface coated with grey membranous not amber-coloured shining scales. From *Rh. fastigiatum* its 2-3-flowered inflorescence and the elepidote corolla separate it. *Rh. fastigiatum* has a lepidote corolla.

See also p. 300.

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Rhododendron sino-Falconeri, Balf. f.

Arbor parva ad 7 m. alta grandifolia. Rami hornotini crassi circ. 1.5 cm. diam. primo pallide fulvo-tomentosi mox griseo-nitentes deinde glabrescentes. Folia longe petiolata ad 3 dm. longa ; lamina crasse coriacea oblongo-elliptica vel elliptica ad 27 cm. longa 16 cm. lata apice obtusa vel rotundata rigide mucronata margine plana tenuiter cartilaginea basi obtusa vel late subcuneata supra viridis maturitate glabra plus minusve rugulosa costa media et venis primariis adscendentibus utrinsecus circ. 13–15 sulcatis subtus spadicea costa media venisque primariis elevatis ubique squamis infundibuliformibus (ex stipite plus minusve longo pluricellulari cupulaque apicali membranacea cellularum isodiametricarum vacuarum vesiculosarum margine in fila lanata articulata plurima intertexta extruso aedificatis) indumentum coactum formantibus vestita ; petiolus crassus ad 4 cm. longus glabrescens. Flores umbellati ; bracteae steriles rotundatae apiculatae extus glanduloso-viscidae, fertiles oblongo-spathulatae circ. 3.5 cm. longae sericeae ; pedicelli subaequales ad 4 cm. longi validi eglandulosi pallide tomentosi squamis quam eae foliorum minus cupulatis sub calyce oblique ampliati. Calycis cupula dense tomentosa lobis inaequalibus plerumque minutis triangularibus vel ovatis vel rotundatis vix 1 mm. longis glabris nunc linearibus longioribus tomentosis vel ciliatis. Corolla pallide flava late campanulata ad 5.5 cm. longa obliqua tubo circ. 4 cm. longo extus intusque glabro basi emaculato, lobis 8 rotundatis emarginatis circ. 2 cm. latis. Stamina 16 inclusa filamentis basi latioribus ibique ciliato-puberulis. Ovarium pilis rufis dense fasciatim tomentosum ; stylus corollam subaequans glaber apice dilatatus ; stigma magnum discoideum lobulatum.

Species aspectu *Rh. Falconeri*, Hook. f. sed foliis supra multo minus rugulosis pedicellis ovarioque eglandulosis divergens.

Yunnan. Mengtz. N. Mountains. Summit of forests. 9000 ft. Tree 20 ft. Flowers pale yellow. Henry. No. 9448.

Hemsley in the Kew Bulletin (1910), 107 refers this plant to *Rh. Falconeri*, Hook. f. against the opinion of Wilson. Wilson was right. The plant is strikingly different from *Rh. Falconeri*. Hooker (Rhod. Sikkim Himal. (1849), 11) precisely describes the pedicels and ovaries of *Rh. Falconeri* as viscid. The viscidity is produced by the conspicuous clavate reddish glands which cover the organs amidst the fewer hairs. The ovaries are so viscid that they glue together the surfaces of the corolla in dried specimens. There is not a trace of these viscid glands in *Rh. sino-Falconeri*, Balf. f., and the character is an easily observed diagnostic mark.

A specimen collected by Hancock under No. 439 on the Great Black Mountain Range at 9000 ft. is also assigned to *Rh. Falconeri*. I have not seen the specimen, but on general grounds of distribution I doubt the identification. So far I know of the occurrence of no one of these large-leaved Himalayan species in Western China. Chinese plants referred to *Rh. grande*, Wight are not that species.

Apart from this differentiating character of the presence or absence of glands there are many others by which the species can be distinguished at a glance. I will not lay stress upon the form of the base of the leaf which in *Rh. sino-Falconeri* is never cordulate whilst that is its shape usually in *Rh. Falconeri*, but the differences in the upper and under surfaces of the leaf in the two plants are thoroughly distinctive. *Rh. Falconeri* is a familiar plant in cultivation, and to most observers, I think, the rugosity of its leaves both above and below, and the dark cinnamon indumentum filling up the excavations on the under side appear as ready marks of recognition. You do not find these features so prominent in *Rh. sino-Falconeri*. There may be a slight rugosity on the upper surface, but the under surface is smooth and velvety with a buff-coloured indumentum. There are no excavations, and the primary veins do not stand out like cords as they do in *Rh. Falconeri*. And along with this we find the under-leaf indumentum in the two species whilst cast in the same general mould is differentiating. In neither species are there epidermal papillae. The epidermis is quite smooth and the leaf-surface is level throughout—there are no pits. The hairs of the tomentum in *Rh. Falconeri* have stout pluricellular stalks which expand at the top as a funnel-shaped membrane one layer thick of many quadrate or rounded thick-walled cells. At the bottom of the funnel

capping, as it were, the stalk is a small convex umbo with reddish or yellowish contents. The margin of the funnel grows out into much-branched fringe segments, which are reddish or brown and interlace with the branches of adjacent funnels. Thus is brought about the more or less woolly tomentum upon which may be seen easily the mouths of the several funnels. In older leaves these may fall away more or less, leaving a paler surface formed by the pedicels and torn fragments of the funnel. In *Rh. sino-Falconeri* the funnel-hairs are likewise formed and make up the indumentum, but the stalks are thinner and longer, the funnel cells are thinner walled, and the marginal fringe segments are longer, their ultimate branches more delicate and paler coloured. Hence in *Rh. sino-Falconeri* we have a softer tomentum and more velvety surface on which the long interlacing hairs spread out. So far as our specimens show, the indumentum here is more persistent. The tomentose coating of the sulcate ovary is composed here of bundles of hairs rising each from a common pluricellular stalk and very closely packed together. The individual branch hairs are long and thread-like. In *Rh. Falconeri* there is nothing of this. Merely secreting glands.

Other marks separating the two species there are, such as :— the flower pedicels in *Rh. sino-Falconeri* are stouter, the flowers are larger. Altogether the plants are thoroughly distinct.

By the name *Rh. sino-Falconeri* is indicated that this species is the Chinese representative of the Himalayan *Rh. Falconeri*. It is—in the present state of knowledge—the most southerly of all the large-leaved species in China.

4483 **Rhododendron sino-grande,** Balf. f. et W. W. Sm.

Frutex grandifolius ad 7 m. altus. Rami juveniles crassi circ. 1 cm. diam. indumento foliorum argenteo-grisei. Alabastrorum ovatorum perulae externae rotundatae acuminato-caudatae rubro-purpureae extus glandulis rubris verruculosae intermediae carinatae. Folia longe petiolata magna ad 4.5 dm. longa ; lamina crasse coriacea oblonga vel oblongo-elliptica vel rarius obovata ad 4 dm. longa ad 19 cm. lata apice rotundata rigide mucronata margine cartilaginea fere plana basi obtusa vix cordulata supra vix plana vel vix areolata opaca viridis glabra costa media lata anguste sulcata venis primariis utrinsecus circa 16 sulcatis subtus argentea nitens costa media venisque primariis secundariisque ex parte elevatis maturitate brunneis primum indumento obtectis sed plus minusve glabrescentibus caeteroquin laevis strato compacto tenuissimo crustiformi uniformi persistente (indumenti pilis breviter stipitatis stipite pluricellulari colorato ad apicem copiose ramoso ramulis unicellu-

laribus latis vacuis vesiculosis quoquoversus intertextis) vestita ; petiolus crassus indumento argenteo plus minusve obtectus glabrescens ad 5 cm. longus. Flores plures umbellatim vel racemoso-umbellatim dispositi rhachi circ. 3 cm. longa eglandulosa tomentosa ; alabastra inflorescentiae globosa ; bracteae steriles ovatae vel orbiculares acuminato-caudatae glabrae, fertiles latae spathulato-elongatae apice rotundatae vel truncatae erosae mucronatae extus intusque sericeae circ. 5 cm. longae 3 cm. latae ; pedicelli crassi ad 3 mm. lati inaequales ad 4 cm. longi sub fructu 6 cm. densissime lanato-tomentosi rubido-grisei indumenti pilis similibus eis foliorum sed stipite breviore et ramulis angustioribus longioribus divaricatim intertextis eglandulosi. Calyx obliquus lanato-tomentosus dentibus minutis pilis obscuratis nonnunquam glabrescentibus. Corolla carnosula alba circ. 5 cm. longa a basi late campanulata obliqua tubo circ. 3.5 cm. longo extus intusque glabro gibboso et basi intus postice varo magno atro-rubro notato, lobis 10 circ. 2 cm. latis emarginatis. Stamina 18 corolla multo breviora filamentis basi latioribus ciliato-puberulis. Ovarium crassum eglandulosum dense lanato-tomentosum pilis rufis fasciatim dispositis ; stylus tubum corollinum paullo superans circ. 2.5 cm. longus glaber validus sub stigmate expansus ; stigma magnum discoideum lobulatum. Capsula tomento plus minusve detersili tomentosa curvata circ. 3 cm. longa 1 cm. lata. Semina oblonga complanata ala angusta arillata longitudinaliter striata circ. 4 mm. longa pallide spadicea.

Species superba *Rh. grandi,* Wall. foliorum indumento floribusque similis sed foliis latioribus, pedicellis dense lanato-tomentosis, ovario eglanduloso, stylo valido brevi bene distincta.

Yunnan. Western flank of the Shweli-Salween Divide. Lat. 25° 20′ N. Alt. 11,000 ft. Shrub of 20–35 ft. In fruit. (Flowers crimson or rose?) In rhododendron forests. G. Forrest. No. 9021. Aug. 1912.

Yunnan. G. Forrest. No. 9369. Dec. 1912.

Yunnan. Shweli-Salween Divide. Lat. 25° 30′ N. Alt. 10,000–11,000 ft. Shrub of 25 ft. Flowers fleshy dull white, with a blotch of deep crimson at base. In rhododendron forests. G. Forrest. No. 11,875. April 1913.

An even finer plant than *Rh. grande,* Wight.

The indumentum in *Rh. sino-grande* and in *Rh. grande* is quite diagnostic. As in other large-leaved species with a hair covering on the under side of the leaf there are no epidermal papillae, and the evenness of the leaf-surface is also not interrupted by pits. Rising from the epidermal cells in numbers are pluricellular hairs which form first of all a stalk of longish

cells—the stalk shorter in *Rh. grande* than in *Rh. sino-grande*—from the top of which branch off many broad thin-walled cells of varying length, and it is these cells which become interwoven and pressed together to form the smooth surface of the under side of the leaf. The stalk cells retain a yellowish content, the branch cells are empty and uncoloured, hence the shining silvery look of the leaf under surface. *Rh. grande* is one of the Himalayan Rhododendrons easily diagnosed by its leaves amongst the large-leaved species. The leaves are always widest at the middle. They seem not to become obovate. The like feature belongs to *Rh. sino-grande*—which has usually broader leaves—except in the case of very large leaves.

Rh. sino-grande is apparently the Chinese representative in South-Western Yunnan of the Himalayan species. But the two species are readily separated by the total absence of glands from the pedicels and ovary of *Rh. sino-grande* and their presence in *Rh. grande*. The glands in *Rh. grande* are typical clavate glands, reddish or yellowish on longer or shorter stalks, and their excretion is extremely sticky. The thin long style of *Rh. grande* projecting the globose stigma from the corolla mouth is a familiar feature of the species. In *Rh. sino-grande* the style is stout, thin, and hardly longer than the corolla tube.

I understand Mr. Forrest has obtained seed of this splendid species. Though its home is in the South-West of Yunnan, the elevation—10,000–11,000 ft.—at which it grows may give us hope that in Britain it may prove to be one of the hardy large-leaved species.

The dried flower bears out Mr. Forrest's description of it attached to his No. 11,875—white, with basal crimson blotch. That he says of the flower of No. 9021 "crimson or rose?" does not invalidate this, for the specimens are in fruit and no fresh flowers were seen by him.

In the Flora of British India (1882) Mr. Clarke treated *Rh. argenteum*, Hook. f. (1849) as a synonym of *Rh. grande*, Wight (1847), and he gave similar treatment to *Rh. longifolium*, Nutt. (1853). Since that date the name *Rh. grande* has come into general use for all the forms which previously passed under Hooker's and Nuttall's names. It is in this sense I speak here and without prejudice of *Rh. grande*, Wight. The suppression of names did not pass without protest. Mr. J. H. Mangles, keenest of observers and unrivalled of growers of Rhododendrons, writing in 1884[1] of "*Rhododendron argenteum* and *Rh. longifolium*," says: "The Sikkim *argenteum* and its Bhotan ally (yet very distinct) *Rh. longifolium* are now in

[1] The Garden, xxv (1884), 177.

bloom. . . . The latest authority doubles *Rh. argenteum* up with *Rh. grande* which, with all humility, I am prepared to show is quite distinct." Elsewhere in the current literature of the day Mr. Mangles gave expression to his view—and here may I ask is there no enthusiast who will bring together and publish the writings upon Rhododendrons by Mr. Mangles which are scattered through horticultural periodicals? A valuable work it would be—that geographical variation in these Himalayan types to the extent of specific difference is a feature of the genus. In one striking passage he says[1]: "As the Himalayan range passes eastward through Nepal, Sikkim, and Bhutan, the genus *Rhododendron* becomes truly protean in form and presents not only an extraordinary number of species in a small space but also striking geographical varieties in very great abundance." To him *Rh. argenteum*, Hook. f. is the Nepal and Sikkim form which finds its representative through Bhutan in *Rh. grande*, Wight and also in *Rh. longifolium*, Nutt. in the same way as in *Rh. Falconeri*, Hook. f. and in *Rh. Thomsoni*, Hook. f. there are to be observed western and eastern forms. The basal soundness of the opinion is borne out by later discoveries of representative forms of the earlier known Himalayan species so far to the eastwards as Yunnan.

Upon the question of the degree of difference between *Rh. grande*, Wight, *Rh. argenteum*, Hook. f., and *Rh. longifolium*, Nutt. nothing of moment can be added as yet to the evidence available to those who in the past have extracted from it the two divergent conclusions which have been stated. And this must remain the position until we obtain more material from Bhutan. Amongst the specimens which have already come to Edinburgh, presented by Mr. Bulley from the collecting of Mr. R. E. Cooper in Bhutan, is one of a Rhododendron in fruit which belongs without doubt to this series, and we will hope that the spoil of Mr. Cooper's further exploration will include additional specimens bearing upon the problem. As Mr. Cooper is primarily collecting seeds the dried specimens he sends are mostly of fruiting plants, and therefore some years must elapse before the plants raised from his seeds will supply satisfactory proof of their identity. I myself am inclined to the view expressed by Mr. Mangles, and expect that when we do get to know the Rhododendrons of Bhutan we shall find that the type which in Sikkim is *Rh. argenteum*, Hook f., in Bhutan shows differences in more than one direction, which justify separate nomenclature of microforms or species under the names *Rh. grande*, Wight, *Rh. longifolium*, Nutt., and probably others.

Meanwhile to come to something more precise, I have to

[1] Gardeners' Chronicle, n.s., xvii (1882), 295.

record here evidence of the spread of the type of *Rh. grande* to areas far outside Bhutan. In these pages are described two distinct species :—one from the Shweli-Salween Divide in Yunnan on the Burmese-Chinese frontier—*Rh. sino-grande*, Balf. f. et W. W. Sm.; one from the Mekong-Yangtze Divide in Northern Yunnan—*Rh. praestans*, Balf. f. et W. W. Sm.

4884 **Rhododendron sphaeranthum,** Balf. f. et W. W. Sm.

Frutex aromaticus lediformis virgatus ad 12 dm. altus laxe ramosus. Ramuli hornotini circ. 1 mm. lati fulvi squamis longe-stipitatis porriginosi seniores nigricantes et stipitibus albidis squamularum decapitatarum setulosi tandem decorticantes. Alabastrorum oblongorum acutiusculorum perulae mox deciduae externae spadiceae coriaceae anguste elongato-triangulares circ. 3 mm. longae 1 mm. latae extus lepidotae margine ciliatae intus puberulae interiores anguste subspathulatae obtusae circ. 6 mm. longae 1 mm. latae membranaceae extus lepidotae margine ciliatae. Folia petiolata ad 2.5 cm. longa crasse coriacea ; lamina anguste oblonga ad 2.2 cm. longa ad 8 mm. lata apice obtusa vel sub-rotundata corneo-mucronulata margine integra revoluta pedibus squamarum delapsarum exasperata basi obtusa vel subcuneatim angustata supra atro-viridis (costa media subsulcata venarum reti caeteroquin inconspicuo) squamarum juvenilium vestigiis conspersis notata subtus porriginosa plus minusve fulva squamis contiguis persistentibus stipitatis ex umbone convexo institaque fimbriata aedificatis paucis majoribus longiusque stipitatis umbone fuscescente stratum superius facientibus caeteris brev-iter stipitatis pallide flavido-viridibus in stratum inferius densum dispositis ; petiolus vix 3 mm. longus lepidotus. Flores rosei vel albi ad extremitates ramulorum strictorum laxe foliatorum in umbellas capituliformes multifloras rhachi lepidota con-gesti ; bracteae steriles late ovatae coriaceae circ. 6 mm. longae extus lepidotae margine ciliatae intus puberulae fertiles ramen-taceae circ. 7 mm. longae 3 mm. latae subobovatae vel spathu-latae ciliatae extus furfuraceo-lepidotae ; prophylla spathulata 5 mm. longa 0.5 mm lata calyce multo longiora lepidota et lanata ; pedicelli brevissimi circ. 1 mm. longi lepidoti. Calyx parvus crateriformis vix 1 mm. longus ad medium fissus lobis rotundatis ciliatis extus interdum squamis paucis lepidotis intus glabris. Corollae 1.6 cm. longae tubus cylindricus paullo curvatus circ. 1 cm. longus extus puberulus intus villosulus, limbi plani discus circ. 1.5 mm. latus, lobi rotundati circ. 4.5 mm. diam. imbricati integri subtus interdum sparsissime lepidoti. Stamina 5 circ. 6 mm. longa filamentis supra basim minute puberulis antheris oblongis 1 mm. longis. Ovarium ovoideum circ. 2 mm. longum 5-lobatum squamis contiguis parvis lepi-

dotum ; stylus parvulus 0.5 cm. longus clavatus ovario multo brevior stigmate 5-lobato coronatus.

Species lediformis ex affinitate *Rh. cephalanthi*, Franch. perulis deciduis, floribus plus minusve roseis, prophyllis calyce multo longioribus, inflorescentiae rhachi et pedicello lepidoto, corolla carnosula extus lepidota, staminum filamentis puberulis, stylo quam ovarium multo breviore notata.

Yunnan. Mountains of the Fengkow Valley. Alt. 12,000–13,000 ft. Lat. 27° 40′ N. Shrub of 18 ins. to 4 ft. Foliage aromatic. Flowers from deep clear rose to pure white. In open pine forests. G. Forrest. No. 12,505. June 1914.

Rh. sphaeranthum, Balf. f. et W. W. Sm. is a small virgate bush with leaves and flower trusses recalling Ledum. *Rh. ledoides*, Balf. f. et W. W. Sm. and *Rh. radinum*, Balf. f. et W. W. Sm. are its nearest allies in the Cephalanthum series, to which it belongs. Like them both in its leaves, it differs from *Rh. radinum* in having the scale-leaves of the foliage buds deciduous, a character in which it resembles *Rh. ledoides*. Differentiating characters are the lepidote not puberulous rhachis of the inflorescence, its long prophylls much longer than the calyx, and its lepidote corolla.

The species is in cultivation and has flowered in Britain.

See also p. 316.

3971 **Rhododendron tapetiforme,** Balf. f. et Ward.

Fruticulus prostratus late atque patens ramosissimus. Ramuli annui circ. 1 cm. longi, annotini circ. 1 mm. diam. squamis peltatis ferrugineis confertis porriginosi seniores nigricantes reliquiis squamularum et pulvinis foliorum delapsorum verruculosi mox desquamantes. Alabastrorum parvorum ovoideorum perulae paucae externae crassae ovatae extus lepidotae internae oblongae obtusae crustaceae apice margineque minute albo-ciliatae dorsoque lepidotae. Folia coriacea parva breviter petiolata ad 1.2 cm. longa ; lamina a petiolo recurvata oblonga vel elliptica circ. 1 cm. longa 6 mm. lata apice obtusa vix mucronulata sed verrucula hydathodali terminata margine leviter recurva basi obtusa vel late subcuneata supra atro-viridis opaca squamis peltatis albidis translucentibus contiguis persistentibus superficiem quasi punctatam exhibentibus lepidota subtus spadicea nitida squamis peltatis contiguis uniformibus ex umbone intensius colorato institaque pallidiore aedificatis induta costa media venisque primariis supra paullo impressis subtus costa media vix elevata venis occultis percursa ; petiolus circ. 2 mm. longus dense spadiceo-lepidotus. Flores brevissime pedicellati in umbellam terminalem 3-floram congesti ; bracteae steriles ovatae vel subrotundatae coriaceae fere lignosae

fertiles tenuiores extus pubescentes elepidotae intus subsericeae; pedicelli circ. 2 mm. longi pubescentes et albido-lepidoti sub calyce expansi. Calycis parvuli cupula circ. 0.5 mm. longa dense albido-lepidota lobis 5 aequalibus minutis vix 0.5 mm. longis et latis sublunatis vel late deltoideis rubris elepidotis margine pilis brevibus ex toto ciliatis. Corollae circ. 1.2 cm. longae roseae extus elepidotae tubus brevis circ. 3.5 mm. longus infundibuliformis basi subgibbosus ad faucem intus minute puberulus in limbum apertum 5-lobatum expansus lobis oblongis circ. 8 mm. longis. Stamina 10 subaequalia corolla paullo longiora filamentis pallide roseis supra basim ad faucem corollae lanato-villosis. Ovarium albido-lepidotum; stylus glaber roseus stamina subaequans; stigma discoideum lobulatum atro-rubens. Capsula 4.5 mm. longa valvis 5 ad basim dehiscens.

Species fastigiata indumenti subfoliaris squamis contiguis et floribus roseis distincta.

Tibeto-Yunnan frontier. Ka-gwr-pw. 15,000 ft. Dwarf, forming a carpet. Flowers pink. F. Kingdon Ward. No. 795. July 1913.

This species belongs to the Lapponicum series, and is one of the forms marked by the contiguous uniform brown scales on the under-leaf surface. It has an elepidote corolla, and the glabrous style about equal in length to the stamens. In indumentum it is like *Rh. rupicolum*, W. W. Sm., but that plant is altogether larger and has a lepidote corolla.

See also p. 300.

3996 **Rhododendron telmateium,** Balf. f. et W. W. Sm.

Suffruticosum humile parvifolium intricato-ramosissimum ad 1 m. altum. Ramuli annui breves circ. 1 cm. longi vel subvirgati circ. 4 cm. longi hornotini tenues vix 1 mm. diam. ferruginei squamis peltatis furfuracei seniores sordide grisei verruculis nigris plus minusve induti mox decorticantes. Alabastra fusiformia circ. 3.5 mm. longa spadicea perulis paucis exterioribus late ovatis extus lepidotis interioribus oblongis obtusis mucronulatis pilis ciliatis. Folia petiolata circ. 1 cm. longa; lamina anguste lanceolata vel oblonga circ. 8.5 mm. longa 3 mm. lata ad apicem angustata ibique conspicue corneo-mucronulata margine vix revoluta basi in petiolum angustata supra canescenti-viridis squamis peltatis albidis contiguis conspicuis uniformibus persistentibus adpressis ex umbone marginatim flavido-nitido institaque lata constructis lepidota subtus alutacea brunneo-punctata squamis (ut supra aedificatis sed biformibus plerisque pallidioribus albidis vel ad umbonem subrufescentibus in stratum inferius dispositis paucioribus longius stipitatis umbone institaque intense brunnea ultra

stratum inferius projectis) obtecta costa media supra subsulcata subtus paullo elevata venis primariis utrinque occultis ; petiolus circ. 1.5 mm. longus indumento sicut folii pagina inferior vestitus. Flores solitarii ad apicem ramulorum terminales ; alabastra ovoidea ; bracteae externae ovatae interiores late rotundatae extus lepidotae margine leviter ciliatae ; pedicelli breves circ. 2.5 mm. longi albido-lepidoti. Calyx circ. 2.5 mm. longus fere ad basim in lobos 5 subaequales oblongos obtusos pallide virides nunc erubescentes extus dense lepidotos margine eciliatos fissus. Corollae roseo-purpureae circ. 1.3 cm. longae tubus infundibuliformis brevis circ. 3.5 mm. longus extus lepidotus intus puberulus haud villosus sursum in limbum apertum expansus disco circ. 1.5 mm. lato lobisque oblongis obtusis 5 circ. 8 mm. longis undulatis. Stamina 5–10 corolla breviora filamentis pallide roseis supra basim paullo pubescentibus. Ovarium subcylindricum pallide viride albido-lepidotum ; stylus glaber roseus corollam staminaque superans ; stigma purpureum lobulatum.

Species fastigiata *Rh. diacrito*, Balf. f. et Ward affinis, foliis lanceolatis apice angustatis mucronulatis differt.

Yunnan. Mountains west of Fengkow Valley. Lat. 27° 40′ N. Alt. 10,000–11,000 ft. Open rocky situations in pine forest. Shrub of 2 ft. Flowers rose-purple. Forrest. No. 12,478. June 1914.

Yunnan. Mountains of the Chungtien plateau. Lat. 27° 30′ N. Alt. 12,000 ft. Open boggy situations on the margins of forests. Shrub of 3 ft. Flowers indigo-purple. Forrest. No. 12,568. June 1914.

One of the Lapponicum series of Rhododendrons. The two sets of specimens collected by Forrest and referred to this species differ markedly in the colour of the corolla, and in No. 12,568 the calyx shows a tendency to reddening, sometimes becoming quite purple—a feature not observable in No. 12,478. But I find no other separating character. The species is near *Rh. diacritum*, Balf. f. et Ward, but the leaf form is here quite diagnostic. It must also be compared with *Rh. drumonium*, Balf. f. et Ward, and with *Rh. pycnocladum*, Balf. f. et W. W. Sm. All of them are of the Lapponicum series, and of the set in it which are marked by the punctulate character of the under-leaf indumentum and also by the lepidote corolla. *Rh. pycnocladum* has quite a different habit from the other three, which are erect shrublets with very many thin twigs bearing small leaves yellowish-grey beneath. The narrow leaves of *Rh. diacritum* separate it from our species. *Rh. drumonium* has a short style.

See also p. 300.

4885 **Rhododendron theiochroum,** Balf. f. et W. W. Sm.

Fruticulus esetosus ad 12 dm. altus foliis (4–5) annotinis ad apices ramulorum subverticillatim aggregatis. Ramuli annotini ad 2.5 mm. diam. lutei vel erubescentes squamis peltatis immersis lepidoti epilosi in anno tertio vel quaterno cinerei et decorticantes. Alabastrorum ovoideorum circ. 3 mm. longorum perulae crustaceo-coriaceae late ovatae vel rotundatae obtusae atropurpureae vel rubescentes dorso lepidotae margine albido-ciliatae. Folia epilosa esetulosa ad 5 cm. longa breviter petiolata; lamina obovata ad 4.5 cm. longa ad 3 cm. lata crasse coriacea apice rotundata vel subtruncata mucrone corneo deflexo praedita coriacea margine obscure crenulato-undulata basi late cuneatim in petiolum crassum circ. 5 mm. longum subalatum foveolatum foveolis squamarum peltatarum vestigiis impletis attenuata, supra laete viridis nitida glaberrima rugulosa costa media sulcata venis primariis utrinsecus circ. 7 vix apparentibus subtus erubescens et glauca papillis epidermicis conoideis elongatis uniformiter praedita et squamis peltatis discontiguis biformibus—magnis parvisque—persistentibus in foveolas profundas immersis haud exsertis punctulatim copiose lepidota squamula quaque ex umbone concavo plus minusve rubro-resinoso instita semi-erecta angusta stipite longo crasso aedificata, costa media elevata straminea paullo lepidota venarum reti caeteroquin occulto. Flores sulfureo-lutei ad 5 in umbellam veram terminalem dispositi; bracteae mox deciduae; prophylla circ. 8 mm. longa filiformia claviformia plus minusve sericea; pedicelli circ. 8 mm. longi sub fructu longiores validi squamulis haud immersis lepidoti. Calyx ad 6 mm. longus ultra medium fissus cupula crateriformi foveolatim lepidota lobis ellipticis subinaequalibus circ. 4.5 mm. longis 3 mm. latis membranaceis erubescentibus extus margineque lepidotis intus nitidis. Corollae subobliquae sulfureo-luteae emaculatae circ. 1.7 cm. longae tubus latus subinfundibuliformis circ. 7 mm. longus intus glaber extus praecipue postice plus minusve lepidotus quinquelobatus lobis rotundatis imbricatis circ. 1 cm. diam. vel majoribus explanatis margine crenulatis. Stamina 10 antipetalina 5 paullo breviora circ. 1.4 cm. longa filamentis validis basi glabris supra basim intra tubum corollinum floccosim villosis, antheris magnis circ. 4 mm. longis laete brunneis. Ovarium conoideum sulcatum basi latum circ. 3 mm. longum squamis peltatis rubro-resinosis dense lepidotum; stylus validus ab apice ovarii abrupte deflexus staminibus brevior ad 6 mm. longus ad basim convexam sparse lepidotus superne expansus et stigmate lobulato coronatus. Capsula cylindrica ad 8 mm. longa 4 mm. lata nigricans squamarum vestigiis asperata.

Species *Rh. sulfureo*, Franch. affinis sed esetulosa et foliis

conspicue obovatis subtus erubescentibus, calycis lobis ellipticis haud setulosis, corolla majore praecipue distinguenda.

Yunnan. Shweli-Salween Divide. Alt. 10,000–11,000 ft. Lat. 25° 30′ N. Shrub of 2–4 ft. Flowers fleshy bright sulphur-yellow. Open situations amongst dwarf scrub. G. Forrest. No. 11,910. April 1913.

This plant is the representative in the Shweli-Salween Divide of the Tali species *Rh. sulfureum*, Franch. It differs from *Rh. sulfureum* in its much thicker and obovate leaves, in its larger flowers, and in the want of setae upon the calyx and elsewhere. This setulose character of *Rh. sulfureum* requires study. The setae are few in number in some plants—Delavay's No. 2212 and Forrest's 4135A are not profusely setulose. The setae are in these species to be found only upon the calyx. But in Forrest's No. 12,434 the setae are profuse beyond the calyx, spreading over the petioles and the stems also. Specimens in which the shoots are thus somewhat strigillose suggest specific difference, but there is amongst Mr. Forrest's gatherings from the same locality and at the same date a gradation of forms from the extreme of abundance to the extreme of poverty in the matter of setae, and one must look upon the character as a varying one in the species. I find no setae on *Rh. theiochroum*. Mr. Forrest has another series of specimens from the Tali Range under numbers 4135B and 6777 which are esetulose. In this they resemble *Rh. theiochroum* as they do in the punctulate lepidoteness of their leaf under-surface. Their leaf form is, however, not obovate, and resembles more that of true *Rh. sulfureum* from which, in addition to the absence of setae, they are separated by this punctulate lepidoteness which is very different from the closer set indumentum of true *Rh. sulfureum*. Taking more minute characters *Rh. theiochroum* is readily diagnosed by its conoid long epidermal papillae from *Rh. sulfureum* where they are low domes; and in this character Forrest's Nos. 4135B and 6777 are quite different from *Rh. theiochroum*, and approach, though they are not identical with, *Rh. sulfureum*. I have not named Forrest's 4135B and 6777 as a distinct species, although I think it is one. What I have said about it may suffice to direct attention to it as a microform of *Rh. sulfureum* to be looked for.

I add here some notes made during the sifting of the material which has given the species described in the preceding pages. They are fragmentary, but I publish them because it is unlikely that I shall deal with these Rhododendrons again,

and the notes may be of use constructively or destructively to some future monographer of the genus. They are perhaps better placed together in this way than incorporated with the specific descriptions. They refer entirely to species which would fall into the Section Osmothamnus.

MAXIMOWICZ'S SECTION OSMOTHAMNUS.

When in 1870 * Maximowicz instituted the Section Osmothamnus of the genus Rhododendron—taking for it the name of the genus framed by De Candolle for two North Asian aromatic shrublets described first of all as *Azalea fragrans*, Adams and *Azalea pallida*, Turcz.—he could bring only one North Chinese species into his Section, namely, *Rh. micranthum*, Turcz. In the years that have passed since Maximowicz wrote upon the East Asiatic Rhododendrons, China has supplied us with more Rhododendrons than were then known from the whole world. A multitude of these forms would claim entry into Maximowicz's Section Osmothamnus, but the new species bring for examination and critical analysis material which shows that in the Section Osmothamnus as framed by Maximowicz more than one natural phylum is included. The groupings of the species within the genus Rhododendron introduced by Maximowicz were a great advance in the direction of natural arrangement over those which were dominant before his essay, and now advance in knowledge seems to require some modification of Maximowicz's sections if by such division of the genus we are to give expression to phyletic relationships.

Maximowicz included eleven species in his Section Osmothamnus :—

Rh. anthopogon, D. Don.
Rh. ferrugineum, Linn.
Rh. fragrans, Maxim.
Rh. hirsutum, Linn.
Rh. lapponicum, Wahlenb.
Rh. lepidotum, Wall. c. vars. Hookerianis [that is including *Rh. elaeagnoides*, Hook. f., *Rh. obovatum*, Hook. f., *Rh. salignum*, Hook. f.].
Rh. micranthum, Turcz.
Rh. nivale, Hook. f.
Rh. parvifolium, Adams.
Rh. pumilum, Hook. f.
Rh. setosum, D. Don.

* Rhododendreae Asiae Orientalis in Mém. de l'Acad. Imp. d. Sc., Petrogr., xvi, No. 9 (1870).

My study of the genus suggests that these species fall into the following natural series :—

A. *Rh. anthopogon*, D. Don.
B. *Rh. ferrugineum*, Linn. ; *Rh. hirsutum*, Linn.
C. *Rh. fragrans*, Maxim.
D. *Rh. lapponicum*, Wahlenb. ; *Rh. nivale*, Hook. f. ; *Rh. parvifolium*, Adams.
E. *Rh. elaeagnoides*, Hook. f. ; *Rh. lepidotum*, Wall. ; *Rh. obovatum*, Hook. f. ; *Rh. pumilum*, Hook. f. ; *Rh. salignum*, Hook. f.
F. *Rh. micranthum*, Turcz.
G. *Rh. setosum*,* D. Don.

Many species have been added to the Section Osmothamnus since Maximowicz wrote, and I am not yet in a position to be able to deal with it comprehensively. What I am to say relates to three of the natural series which I seem to see amongst the species named by Maximowicz—that of *Rh. anthopogon*, that of *Rh. fragrans*, and that of *Rh. lapponicum*. Descriptions of new species belonging to all of these are given above, and I have to add another natural series of which no species was known to Maximowicz—that of *Rh. cephalanthum*. I call the series respectively Anthopogon, Fragrans, Lapponicum, Cephalanthum, after the oldest-described species, and in that sense these designations appear in the discussion of specific relationships in the foregoing pages.

ANTHOPOGON SERIES.

G. Don instituted the Section Pogonatum, in which his *Rh. anthopogon* was the sole species, and I would have taken that name for the series but that the Section Pogonatum has had species thrust into it which are not of the series of Anthopogon, and I wish to aggregate phyletic forms around a central type.

The several characters of the Anthopogons are :—

Aromatic shrubs with small short-stalked leathery leaves ultimately dark green above and blood red beneath with peltate scales composed of an umbo charged with shining red secretion and of a narrow few-armed fringe. An upper layer of scales on the under side of the leaf forms a smooth surface covering scales in all stages of development. Many scales of the twigs and petioles losing their disks become setae. Bracts of the capitate umbel broad not falling off until flower-opening, always lepidote and fringed. Calyx campanulate unequally lobed, lobes

* Perhaps the grounds upon which I separated "setosum" may not be valid. I have not yet been able to study it adequately.

green more or less membranous. Corolla oblique tube relatively long curved fleshy villous at throat and downwards, lobes repand, yellow, pink or white. Stamens glabrous or puberulous. Ovary and style very short, about same length.

To the series as I know it belong the following species :—

Rh. anthopogon, D. Don.	Nepal, S.W. Sikkim.
Rh. hypenanthum, Balf. f.	N.W. Himalaya.
Rh. haemonium, Balf. f. et Cooper.	Bhutan, perhaps also N. and E. Sikkim. 13,000 ft.
Rh. rufescens, Franch.	Yunnan.

That there are others yet to be recognised I have no doubt.

KEY TO THE SPECIES.

1. Perulae persistent. Corolla yellow . . . *hypenanthum*.
   Perulae deciduous . . . . . 2.
2. Corolla yellow . . . . . *haemonium*.
   Corolla rose to white . . . . . 3.
3. Calyx lobes obovate-oblong lepidote. Filaments glabrous. *anthopogon*.
   Calyx lobes narrowly oblong glabrous. Filaments puberulous. *rufescens*.

In cultivation are *Rh. anthopogon* and *Rh. hypenanthum*—perhaps also *Rh. haemonium*.

Rh. anthopogon was described and named in 1821 by D. Don from Wallich's Gossain Than specimens.* The description is good as a diagnosis of the species from other forms known at the date of writing, but in the present time of so much more knowledge of Rhododendrons from the Himalayas, Northern

* D. Don in Mem. Wern. Soc. iii (1821), 409. The paper in which the description is given was read before the Society on 18th Nov. 1820. Don's description runs :—

Rhododendron anthopogon, ramulis dense pubigeris ; foliis ovalibus subtus dense tomentosis ; floribus capitatis ; corolla subhypocrateriformi fauci barbato, genitalibus inclusis.

Habitat in Alpe immensa nivosa, Gossaignsthan Nepaliensium dicta. D. Wallich. ♄.

Frutex △ pedalis fasciculatim ramosissimus, ramis fastigiatis ; cortex rugosus, rimosus, deciduus, ramulis pube brevissimo ferrugineo dense instructis ; folia ovalia petiolata subretusa coriacea supra nuda anastomosanti venosa, subtus dense ferrugineo-tomentosa. Flores capitati ; pedunculi brevissimi resinosi ; laciniae calycinae breves rotundatae margine villosae ; corolla subhypocrateriformis roseo-purpurea, tubo cylindrico, laciniis rotundatis crispato-crenulatis, fauce villo tortuoso candido barbato ; genitalibus tubo inclusis ; filamenta plana glabra ; stylus superne crassior staminibus duplo brevior ; stigma depressum.

Rhododendron dauricum, ab supera primo discriminatur foliis tenuioribus deciduis nudis utrinque punctis resinosis crebre instructis ; floribus paucis lateralibus, corollis subrotatis tubo vix ullo fauce nudo ; genitalibus longe exsertis ; stigmate capitato.

Asia, and Western China, Don's characterisation is little more than a group distinction.

In 1825 D. Don republished in an extended form his description of *Rh. anthopogon*, citing again only Wallich's Gossain Than specimens.* It is noteworthy that in these two descriptions Don gives the flower colour as "roseo-purpurea" and "rosea," but no mention is made in either of whorls of persistent foliage-bud scale-leaves. Are we to assume the absence of these scales on the Gossain Than plants? When present on plants of this alliance the scale-leaves are conspicuous and cannot be overlooked. One must suppose that Don's authority for the flower colour was Wallich himself.

In 1834 George Don published a description of *Rh. anthopogon*, citing only Gossain Than plants.† A remarkable change is now introduced. The flowers are said to be "sulphur-yellow," and there is no reference to "roseo-purpurea" or "rosea" of the earlier descriptions. Further—G. Don adds to his description "Clt. 1820." Now Wallich was in Nepal from December 1820 until November 1821,‡ and obtained during that period, I presume, his Gossain Than specimens. The plants cultivated in Britain in 1820 could not therefore be

* D. Don, Flora Nepalensis (1825), 153. The revised description runs :—

Rhodendron anthopogon, ramulis pubescentibus, foliis ovalibus subtus ferrugineis lepidoto-tomentosis, floribus glomeratis pentandris, corollis hypocrateriformibus fauce lanatis ! staminibus inclusis.

Rhododendrum anthopogon in Mem. Wern. Soc. iii, p. 409.

Hab. in Gosaingsthan Nepalensium. Wallich. ♄.

Frutex pedalis v. sesquipedalis, sempervirens, rigidus, fasciculatim ramosissimus. Rami flexuosi, fastigiati, cortice rugoso laminoso deciduo. Ramuli teretes, pube brevissima ferruginea lepidota omnino tecti. Folia ovalia, coriacea, petiolata, supra nuda, opaco-viridia ac reticulato-venosa, subtus dense lepidota, ferruginea, apice mucronulo reflexo. Flores terminales, glomerati, subsessiles. Pedicelli breves, lepidoti et resinosi. Calyces campanulati, 5-partiti, virides : segmenta ovalia, apice rotundata, margine villosa. Corolla hypocrateriformis ! rosea : tubus cylindraceus, limbo plurimum longior, superne dilatatus : lobis limbi rotundatis, crispato-crenulatis : faux coarctata, lana copiosa nivea tortuosa tecta ! Stamina 5, inclusa ! tubo multo breviora. Filamenta gracilia, erecta, glabra. Stylus superne crassior, staminibus plurimum brevior. Stigma clavatum. Capsula 5-locularis, 5-valvis.

† G. Don, Syst. iii (1834), 845. The description runs :—

Rh. anthopogon (D. Don in Mem. Wern. Soc. iii, p. 409)—branchlets downy, leaves oval, rusty beneath from lepidoted tomentum ; corollas with a woolly throat. ♄ F. Native of Nipaul, on Gosaingsthan. R. aromaticum, Wall. cat. Shrub much branched. Leaves ending in a reflexed mucrone, naked above. Flowers glomerate, sulphur-coloured. Pedicels short, lepidoted and resinous. Calycine segments rounded at the apex, with villous margins. Segments of corolla roundish, with undulately curled margins. Filaments glabrous. Stigma clavate.

Bearded-flowered Rhododendron. Fl. April, May. Clt. 1820. Shrub 1 to 1½ foot.

‡ Burkill, Notes from a Journey to Nepal in Rec. Bot. Surv. Ind. iv (1910), 59.

derived from Wallich's Nepal seeds or plants. What, then, was the source of the plant with sulphur-yellow flowers recorded by G. Don as in cultivation in 1820?

Perhaps we get some light on the question from Wallich's Catalogue. In the part of it published in 1829, the name *Rh. anthopogon*, D. Don appears under No. 759, and two stations are given:—1. Gossain Than; 2. Kumaon. Wallich therefore did not differentiate specifically N.W. Himalayan and Nepal specimens. This is the starting-point of a confusion which remains to this day. It seems to be likely that the plants to which G. Don refers as in cultivation in 1820 were derived from N.W. Himalaya. Abundance of plants had been introduced from N.W. Himalaya before this date, and as we now know all the N.W. Himalayan plants which have been named *Rh. anthopogon*, Don have yellow flowers. We also know that there are yellow-flowered plants of the Anthopogon phylum in the East Himalaya—Bhutan, N. and E. Sikkim. Were Bhutan and Sikkim plants in cultivation at this early date? G. Don's book of 1834 was intended to be a gardener's dictionary. One may suppose that he would go to the garden not to the herbarium for his material; he found in cultivation this yellow-flowered plant to which, in absence of any Nepalese rose-purple or rose-flowered plants, the name *anthopogon* had become attached, and accepted it as the same as the Gossain Than plants, changing the colour designation in his description. Handbooks of to-day describe *Rh. anthopogon*, D. Don as yellow-flowered, but in cultivation nowadays under the name *Rh. anthopogon* there are pink-flowered and white-flowered plants, and also yellow-flowered plants. The pink-flowered with the white-flowered plants are not of the same species as the yellow-flowered, and the yellow-flowered plant as I have seen it is not the original and true *Rh. anthopogon*, D. Don.

In 1839 Royle figured* under the name *Rh. anthopogon*, Don a yellow-flowered plant of which he gives the distribution "Gossain Than and Sereenugur. *Wall.* Choor, Kedarkanta, and Lippa, etc., in Kunawur." Royle thus accepts the authority of Wallich's Catalogue, and he tells us that he had examined the sheets in the E. I. C. Herbarium. Two points in Royle's figure invite attention—the large yellow flowers and the persistent foliage-bud scale-leaves forming rosettes upon the branches at the base of the several years growth. Assuming that D. Don's descriptions in 1821 and 1825 of the Gossain Than plants are correct, the yellow flower-colour of Royle's plant separates it

* Royle, Ill. Himal. i (1839), 259, 260, t. 64, f. 2. Royle's book was issued in parts, and the date of publication of this figure would be earlier than that cited, which is the date on the title-page. Issue of the later parts of the work was much delayed.

from them, but it may represent the plant of G. Don's description in 1834. As regards the foliage-bud scale-leaves, they are present on every N.W. Himalayan dried specimen which I have seen of the alliance, and they are absent from every East Himalayan dried specimen. They are not visible on the Gossain Than specimens in the Wallichian Herbarium now at Kew, as Dr. Stapf kindly informs me, and from the same source I learn that they are present on the Badrinath, Srinagar specimens in the same herbarium. I find them on all the yellow-flowered plants of the alliance which are in cultivation at Edinburgh, and they are absent from all our pink-flowered and white-flowered plants.

In 1841 Graham gave an account of *Rh. anthopogon*, D. Don * based upon living plants flowering at Dysart House, Fifeshire. He says that the plants were obtained from Messrs. Loddiges five years previously and had flowered in three successive years. Graham's description was transferred to the Botanical Magazine in the following year (1842) as text to the illustration t. 3947. The figure shows a plant with "yellowish-white" flowers, and, according to Graham, it differed from Dr. Royle's figure in being of much paler colour, in the segments of the corolla being much broader, overlapping, and undulate, and in the bracts being rusty rather than yellow. The Botanical Magazine figure does not show persistent foliage-bud scale-leaves, and another noticeable point is that the flower truss has comparatively few flowers, many fewer than in the usual bright yellow N.W. Himalayan plant. In the Edinburgh Herbarium are two twigs of the Dysart House plant, unfortunately broken and fragmentary, furnishing no satisfactory evidence for determining their origin from N.W. or E. Himalaya. One would not expect so skilful an artist as Mr. W. Fitch to omit representation of the persistent foliage-bud scale-leaves had they been present on the specimen from which he made his illustration, and if one makes the point critical, then the plant figured was from the East Himalaya. The "yellowish white" flower is of less moment, because in cultivation the colour is sometimes quite pale from the outset in the N.W. Himalayan plant. Graham's text does not help to a decision, for, elaborate though it be, it is not specific within this now very large genus. The data do not suffice for a decision upon the question of what plant the Botanical Magazine figure represents. If Sikkim plants were coming into Britain at so early a date the plant might well be one of them. I have not seen in cultivation a plant of which the figure is a correct representation.

The next important landmark in this history is the advent of the Sikkim Rhododendron in the late 'forties. Of *Rh.*

* Graham in Edin. New Phil. Journ. xxxi (1841), 394.

anthopogon, D. Don, Sir Joseph Hooker says:* "Nothing can exceed the beauty of its flowers, whether we consider the exquisitely tender, membranaceous, translucent texture of the corolla, with its delicate nervation, or the rich blush of the first opening blossoms, which insensibly passes into snowy white, then faintly tinged with sulphur—all colours seen on one and the same plant." Hooker quotes the Nepal and Kumaon stations of Wallich's Catalogue, and adds that of Sikkim Himalaya. Hooker's account of the flower colour brings us back to the Gossain Than plant of the original description of *Rh. anthopogon*, D. Don. Doubtless, since Hooker's exploration, seeds of the Sikkim plant have reached Britain frequently. Certain it is that we have in cultivation nowadays plants which in their flower colour show the succession of changes observed by Sir Joseph Hooker. But the faint sulphur-yellow tint acquired by the fading white is never like the yellow of the flower of the plant which shows yellow from the outset. Hooker's dried specimens from Sikkim have not got persistent foliage-bud scale-leaves, differing thus markedly from all the N.W. Himalayan plants. Of Sikkim dried specimens in the Edinburgh Herbarium in addition to the Hookerian one, are:—Jongri (T. Anders., No. 767); Yangpoong (Watt, No. 5447); Singaleelah (Watt, No. 5217, flowers lemon green); Ritampoo (Watt, No. 5284, flowers fresh pink; 5293, flowers lemon white, 5418). Observe that Sir George Watt confirms Hooker's account of variation in flower colour. In no one of the Sikkim plants are there persistent foliage-bud scale-leaves. I may add also that Hamilton's No. 1083 from the Snow Mountain in Nepal is also without persistent foliage-bud scale-leaves—about its flower colour there is no information.

I am led by the facts to believe:—

(*a*) This Sikkim plant to which Hooker refers is the same as the Nepal one originally described as *Rh. anthopogon*, D. Don. Characters of it are:

1. The flower colour is pink to white, sometimes on fading becoming slightly sulphur-coloured, but it is not from the beginning dark yellow;
2. There are never persistent foliage-bud scale-leaves upon it.

(*b*) The N.W. Himalayan plant is different. It is not the original *Rh. anthopogon*, D. Don, but is the plant of which George Don says the introduction took place in 1820, and to which he adjusted his description of *Rh. anthopogon* in 1834, ignoring the Nepalese

* Hook. f., The Rhododendrons of Sikkim (1849), Conspect. 7. See also Hook. f. in Journ. Roy. Hort. Soc. Lond. vii (1852), 104.

plant. It is the plant to which gardening books so often refer as *Rh. anthopogon*, D. Don. Characters of it are:—

1. Flowers yellow from the outset in large trusses;
2. Foliage-bud scale-leaves are persistent.

More than this, the N.W. Himalayan plant is, as I shall explain presently, that which Maximowicz took to be his *Rh. fragrans*, Maxim. spread into the Himalaya, but it is not that species. It has to be named, and I call it **Rh. hypenanthum,*** Balf. f. Specimens of it in the Edinburgh Herbarium are—Kishtwar (T. Thomson, sub nom. *Osmothamnus fragrans*); N.W. India (J. L. Stewart); Keylang, Lahaul (Watt, Nos. 2463, 2504); Kiltu Kunda (Watt, No. 3337); Kukti Village (Watt, No. 2522); Murali (Watt, Nos. 8641, 13,576); Kulu (Watt, No. 13,631); Garhwal (Duthie, No. 941); Kashmir (Duthie, No. 11,021); Galja Byans (Reid); Dakwani (Reid); Bashahr (Lace, No. 231); Chamba (Lace, No. 1578); Kilas (Minniken). A full description of this species will appear shortly.

There is yet to be noted a further confusion of species under the name *Rh. anthopogon*.

The definition of *Rh. anthopogon*, D. Don given by Clarke in the Flora of British India† was not fortunate in the interests of precise knowledge. Instead of sifting relationships of described forms, Clarke seems to have gone to Maximowicz's story of East Asiatic Rhododendrons, and to have transferred to *Rh. anthopogon*, Don the whole of the species therein described by Maximowicz. The outcome of Clarke's combination of forms is that the *Rh. anthopogon* of the Flora of British India becomes a chimaera suggested by four already described species—*Rh. anthopogon*, D. Don, *Rh. fragrans*, Maxim., *Rh. micranthum*, Turcz., and *Rh. parvifolium*, Adams, along with one hitherto undifferentiated species—*Rh. hypenanthum*, Balf. f.—and also probably *Rh. haemonium*, Balf. f. et Cooper.

Franchet‡ has noticed the heterogeneity of the *Rh. anthopogon* of the Flora of British India. When dealing with *Rh. rufescens*, Franch., a West Chinese species, he says:—

"La délimitation spécifique est difficile à établir dans le petit groupe des Osmothamnus, dans lequel il n'est guère possible de ne voir qu'une seule espèce, comme l'ont pensé quelques auteurs. Il suffit, pour s'en convaincre, d'examiner

* *Rh. hypenanthum*, Balf. f.—Species *Rh. anthopogoni*, Don persimilis sed alabastri perulis per annos plurimos verticillatim persistentibus floribusque ab initio aureo-luteis facile distinguenda.

† Clarke in Fl. Brit. Ind. iii (1882), 472.

‡ Franchet in Journ. de Bot. ix (1895), 397; also in Bull. Soc. Bot. France, xxxiv (1887), 284.

la synonymie du *Rh. anthopogon*, Don, telle qu'elle a été établie dans le 'Flora of British India.'"

I need say no more here about the parts of Clarke's combination that are to be segregated as the true *Rh. anthopogon*, Don, and *Rh. hypenanthum*. Of the others :—

Rh. fragrans, Maxim. finds its nearest alliance with *Rh. anthopogonoides*, Maxim. and other Chinese species. See on p. 293.

Rh. parvifolium, Adams is not a near ally of *Rh. anthopogon*, Don. It belongs to the Lapponicum series, represented outside Asia as well as in W. Asia by *Rh. lapponicum*, in the Himalayas by *Rh. nivale*, Hook. f. and in West China, where it seems to attain its maximum of over a score of species. See p. 299.

Rh. micranthum, Turcz. is a species which has been much misunderstood—it is neither in the Anthopogon nor the Lapponicum series.

Rh. haemonium, Balf. f. et Cooper may be best described as an Eastern form of *Rh. hypenanthum* of the Western Himalaya. The plants in dried specimens are not unlike, but the Bhutan plant never has the persistent foliage-bud scale-leaves of *Rh. hypenanthum*, and is recognisable at sight. They both have the same intensely yellow corolla. From Northern and Eastern Sikkim there are specimens in the Edinburgh Herbarium which are probably this species *Rh. haemonium*, and possibly some of such Sikkim plants may have been included in the aggregate that appears as *Rh. anthopogon*, D. Don in the Flora of British India. *Rh. haemonium* is certainly not the true *Rh. anthopogon*, Don, and is very different from the S.W. Sikkim plants of the group.

FRAGRANS SERIES.

I give the name Fragrans to a series of species distinguished from those of Anthopogon by never having agglutinate rufescent under-leaf indumentum, and from those of Cephalanthum by never having a lax open fawn-coloured under-leaf indumentum. The general characters of the series are :—

Aromatic shrubs with short-stalked small leathery leaves ultimately dark green above and pale fulvous beneath, with peltate shortly stalked uniform scales producing a compact not loose or agglutinated surface of scales ; the umbo of the scales usually with a bright yellow ring of secretion and girt by a narrow few-armed fringe. Many scales of the twigs and petioles lose their disks, becoming setae. Bracts of the capitate umbel lepidote and fringed falling after flower-opening. Calyx unequally lobed. Corolla fleshy, villous at throat, glabrous outside, rose, white, or yellow. Stamens puberulous. Ovary

and style very short, style the shorter, ovary always lepidote, but scales soon becoming agglutinated.

The following species belong to the series :—

Rh. anthopogonoides, Maxim.	Kansu.
Rh. clivicolum, Balf. f. et W. W. Sm.	Yunnan, N.E. of the Yangtze bend. 11,000–12,000 ft.
Rh. cremnophilum, Balf. f. et W. W. Sm.	Yunnan—Chungtien plateau. 13,000 ft.
Rh. fragrans, Maxim.	E. Siberia.
Rh. primulaeflorum, Franch.	Tibet : between Lhasa and Batang.
Rh. trichostomum, Franch.	Szechwan : Tungngolo and Tatsienlu.

KEY TO THE SPECIES.

1. Leaves 3 cm. or more long. Flowers white to yellow. Inflorescence axis puberulous . . 2.
   Leaves under 3 cm. long. Flowers rose to white. Pedicels lepidote . . . . 4.
2. Bracteoles longer than calyx . . *primulaeflorum.*
   Bracteoles about equalling calyx . . . . 3.
3. Pedicels hairy. Calyx elepidote . . *anthopogonoides.*
   Pedicels lepidote. Calyx lepidote . . . *clivicolum.*
4. Inflorescence axis lepidote. Calyx lobes elepidote, fimbriate-setulose . . . *fragrans.*
   Inflorescence axis puberulous . . . . 5.
5. Calyx lobes lepidote, ciliate, 4 mm. long . . *cremnophilum*
   Calyx lobe elepidote, scale-fimbriate, 2 mm. long . . . . . *trichostomum.*

None of these species are in cultivation.

Rh. fragrans.—So long ago as 1808 Adams described and figured * under the name of *Azalea fragrans*, Adams a plant with rose-coloured flowers from the banks of the Lena in

* Adams in Mém. Acad. Petersb., ii (1808), 332, t. 14. The following is the description given by Adams :—

Azalea fragrans, Adams.—A. foliis reguloso-punctatis subtus discoloribus, ellipticis, obtusis ; floribus (10–v 15) subcapitatis, genitalibus inclusis.

Fruticulus pedalis et ultra, erectus ; ramis patentibus. Caulis crassitie pennae cygneae, ligno albicante ; cortice griseo-fusco, per senectutem secedente, laevi, ramulorum tuberculoso scabro ; ramulorum annotinorum leviore, ferrugineo-tomentoso. Rami, ramulique terni, quaternique e summitatibus ramorum anni praecedentis. Folia in ramulis sparsa, conferta, sempervirentia, breviter petiolata ; petiolo ferrugineo-pubescente, elliptica, obtusa, integerrima, margine revoluta, supra glabra, viridia, nervo medio et venis depressis et inde rugosula, subtus squamulis minutissimis irregularibus ferrugineis vestita, nervo prominulo, leviora, caeterum patentissima, semipollicaria et ultra, amoene fragrantia, aromatica. Capitula in ramulis, supra ortum gemmarum terminalia, tecta squamis ramentaceis, ovatis, obtusis, firmis, fusco-ferrugineis, tomentosulis, ciliatis, deciduis. Antheris cum ineunte vernatione coaetanea, floribus 10–15 e capitulis erumpentibus, brevissime pedunculatis, singulis ad basin bractea ramen-

Eastern Siberia. Well described the plant is, although as Maximowicz has pointed out the figure leaves something to be desired. In 1838* De Candolle established the genus Osmothamnus to include Adams' species as well as a plant with white flowers from the Baikal Alps which Turczaninow its collector regarded as a distinct species. To these plants De Candolle gave the names respectively *O. fragrans*, DC. and *O. pallidus*, DC. When in 1870 Maximowicz published his revision of East Asiatic Rhododendrons,† he sank Osmothamnus in Rhododendron and combined De Candolle's species in one *Rh. fragrans*, Maxim. At the same time Maximowicz extended the distribution of the species by including, in addition to plants from many stations in Eastern Siberia, a plant collected by T. Thomson at Kishtwar in the N.W. Himalayas. He qualifies the identification, it is true, by the comment upon the dried specimen, "spec. flor. fere destr.," a remark no less applicable to the specimen in the Edinburgh Herbarium. I suspect that Maximowicz may have been influenced in this determination by the fact that Thomson's specimens are named on the sheet *Osmothamnus fragrans*, DC. But Thomson's Kishtwar plant is not *Rh. fragrans*, Maxim. It is yellow-flowered, not rose-flowered or white-flowered, and it has persistent foliage-bud scales, which are absent from *Rh. fragrans*, Maxim., and shows many other points of difference.‡ We must look upon

tacea, ciliata mox emarcida vestitis. Pedunculus vix semilineam longus, squamuloso-tuberculatus, versus medium bracteis duabus linearibus, ciliatis, pubescentibus, mox emarcidis, lineam longis, ferrugineis instructus. Calyx hypogynus, brevissimus, glaber quinquangularis, basi gibbus, tubo triplo brevior, persistens, quinquefidus; laciniis erectis, subovatis, acutiusculis, vix margine pubescentibus. Corolla hypogyna, saepius decidua, semi-pollicaris, glabra, infundibuliformis; tubo ferrugineo-variegato, supra medium gibbo; fauce sensim ampliata et limbo roseo-purpureis: Limbi patentes, quinquefidi, laciniae suborbiculatae, vix ac ne vix quidem crenulatae, tenuissime venulosae. Stamina quinque, perigyna, immo calyci affixa, subaequalia, tubo parum breviora, glabra, subpersistentia; filamentis filiformibus; antheris erectis, bilocularibus. Pistillum staminibus duplo brevius, vix calyce longius, ovaria subglobosa, sulcis quatuor obliteratis, stylo brevissimo, stigmate ampliato-depresso. Capsula subglobosa, quadrilocularis, quadrivalvis, quadrisulcata, ad margines valvarum introflexos septa constituentes, chordaeque pistillari ante maturitatem affixos. Valvulae apice sulco obliterato. Semina numerosa, linearia, minuta, fusca congenerum.

Habitat in provinciis septentrionalibus Sibiriae orientalioris usque ad littora maris glacialis, ubi specimina florentia mense Julio legi.

Proxima *Azaleae lapponicae*; differt caule robustiore, foliis majoribus floribus numerosis, brevissime pedunculatis, genitalibus que inclusis, quae in *A. lapp.* cum mascula, tum foeminea, exserta.

Odor praestantissimus aromaticus, accedens ad *Rhododendri daurici.*

* De Candolle, Prod., vii (1838), 715.

† Maximowicz, Rhododendr. As. Orient. (1870), 16.

‡ As Franchet points out in Bull. Soc. Bot. Fr. xxxiv (1887), 285, where he describes *Rh. fragrans* var. *parvifolia*, a plant referred by Rehder and Wilson to *Rh. trichostomum*. I have no material upon which to form an independent opinion.

Rh. fragrans, Maxim. as an Eastern Siberian species only, for Thomson's Kishtwar plant is *Rh. hypenanthum*, Balf. f., of the Anthopogon series. Whilst taking a N.W. Himalayan plant which had been for so long confused with *Rh. anthopogon*, Don as part of *Rh. fragrans*, Maximowicz differentiated *Rh. anthopogon*, Don itself, for he says of *Rh. fragrans*: "Anthopogoni non parum affine," and gives diagnostic characters. In this Maximowicz was right, and the differences are even greater than he stated them to be. *Rh. fragrans* belongs to a group other than that of Anthopogon. Notwithstanding Maximowicz's precise statements, C. B. Clarke,* when dealing with *Rh. anthopogon*, Don as an Indian plant, brought *Rh. fragrans* (with its synonymy as given by Maximowicz) into the chimaera which he created under the name *Rh. anthopogon*. See p. 291.

Rh. fragrans does not appear as a plant of cultivation, and I do not suppose it has any features making it more desirable in horticulture than many of the aromatic shrubs of the Anthopogon and the Cephalanthum series. It must not be confused with the *Rh. fragrans*, Hort. which, according to De Candolle,† is only the American *Rh. maximum*, Linn. The scent there comes from the flower; in Maximowicz's plant from the vegetative shoots. In the herbarium at Kew are specimens of *Rh. fragrans*, Maxim. collected by Adams at the Lena and by Turczaninow between Jakutzk and Ochotzk, and in the herbarium of the British Museum there is also a specimen from Eastern Siberia. To the heads of these herbaria I am indebted for allowing me to examine the specimens from which I have made up the following description of *Rh. fragrans* which may be of use in further critical study of this series of Rhododendrons :—

Rhododendron fragrans, Maxim.—Small aromatic shrub about 30 cm. or more high erect with many spreading branches. Branches a year old about 1.5 mm. in diameter densely clad with a fulvous coating of peltate scales with some setae formed by the stalks of scales from which the disk has fallen. Older branches slightly scabrid then becoming dirty grey and ultimately the hard bark splits off. Buds small with few scale-leaves ovoid, scale-leaves falling early; outer scale-leaves about 3 mm. long ovate acute mucronulate keeled crustaceously coriaceous fulvously lepidote along the keel elsewhere adpressedly puberulous, margin slightly membranous and very finely shortly ciliate puberulous inside, inner scale-leaves oblong spathulate submembranous with a median vein but hardly keeled and hardly mucronulate about 5 mm. long and 2 mm. broad outside puberulous, margin finely ciliate inside puberulous. Leaves up to 2 cm. long

* Clarke in Flora of Brit. Ind., iii (1852), 472.

† De Candolle, Prod., vii (1838).

shortly petiolate; blade oblong or elliptic-oblong narrow to each end about 1.6 cm. long and 8 mm. broad thick leathery with a small apical mucro, margin slightly revolute slightly roughened by bases of fallen scales, base obtuse or very slightly rounded; upper surface dark green midrib sulcate elsewhere slightly rugulose but primary veins not particularly conspicuous, more or less marked by pittings or greyish fragments (the remains of peltate scales which densely covered the young leaf); under-surface fulvous never rufescent the midrib slightly elevated and covered like the rest of the smooth surface by peltate persistent scales these are contiguous overlapping each having an umbo which develops a yellow content girt by a narrow lobed fringe, the scales are not agglutinated; petiole about as much as 4 mm. long usually shorter densely lepidote. Flowers racemosely arranged about 10–15 together in small terminal trusses, axis of inflorescence lepidote with setae formed from the scale-stalks; the outer bracts rounded about 5 mm. broad fulvous not keeled but somewhat apiculate with a somewhat membranous ciliate margin lepidote on the back and puberulous inside; the inner bracts ramentaceous obovate spathulate about 5 mm. long and 4 mm. broad lepidote on back lanate-ciliate puberulous inside; prophylla linear claviform about 4.5 mm. long longer than the calyx; pedicels about 1.5 mm. long lepidote. Calyx small and variable cut to nearly the base into five lobes sometimes 2.5 mm. long sometimes about 1mm.; the cup is saucer-shaped and glabrous outside, lobes from deltoid to ovate to oblong or elongate triangular longer ones perhaps 1 mm. broad membranous or if short rigid with a few or no peltate scales outside, margin in longer ones lepidote-fimbriate in smaller ones with long setae at top even longer than the lobe itself. Corolla about 1.2 mm. long membranous throughout hardly oblique, tube glabrous outside pubescent inside about 8 mm. long expanding into a rosy purple spreading limb cut into 5 rounded lobes hardly crenulate and about 6 mm. in diameter. Stamens 5 about 7 mm. long nearly as long as corolla tube, filaments dilated downwards and at base puberulous, anthers small oblong barely 1 mm. long. Ovary conoid 5-lobed and densely lepidote about 1.5 mm. long; style stout clavate about 0.75 mm. long crowned by a lobed stigma.

I am puzzled over one character. Adams says—and Maximowicz makes a point of the character—that the stamens are glabrous. I do not find them so. The Anthopogons, excepting *Rh. rufescens*, Franch., have glabrous stamens. The whole series to which *Rh. fragrans* belongs has puberulous stamens. In its rose-coloured (sometimes white) flowers *Rh. fragrans* resembles *Rh. cremnophilum*, Balf. f. et W. W. Sm., but its

habit, larger leaves and their form, its shorter bracts, and lepidote pedicels easily distinguish it.

Rh. anthopogonoides, Maxim., is another little known species of the Fragrans series. It was collected in Kansu by Przewalski in 1872, and so far as I know by no one since that date. I expected that Mr. Farrer would have found it during his recent expedition and have introduced it to cultivation. The only small Rhododendron at all resembling it which I have seen in Mr. Farrer's collection is *Rh. praeclarum*, Balf. f. et Farrer, a new species of the Cephalanthum series. See pp. 261, 317. I give here for comparison a description of Maximowicz's species—not that I have much material upon which to base an account of it. I have only one specimen, presented to the Edinburgh Herbarium by Maximowicz and named by himself, so that I am sure of the plant to which he gave the name.*

Small shrub copiously and fastigiately branched. Branchlets a year old densely coated by peltate resinous-centred scales and also by short setae formed by the stalks of scales from which the disk has fallen; older twigs blackening and showing remains of scales and setae afterwards shedding the bark. Foliage-buds ovoid small coated by small fulvous outer scale-leaves densely lepidote outside with short resinous scales. Leaves about 3.5 cm. long petiolate; lamina thick coriaceous about 3 cm. long and as much as 2 cm. broad elliptic mucronate at apex margin slightly revolute entire slightly roughened by the bases of juvenile scales or setae which have fallen off, base obtuse or somewhat truncate or with lobes slightly rounded; upper surface opaque midrib and primary veins more or less sulcate; under surface never rufescent at most a pale rusty brown densely lepidote the peltate scales uniform contiguous with umbo more or less orange-

* Maximowicz, in Mél. Biolog. ex Bull. Acad. Imp. Sc., St. Petersb., ix (1876), 772, describes the plant as follows :—

Rhododendron anthopogonoides (*Osmothamnus*, Maxim.).—Pumilum inordinate fastigiatoramosum; ramis juventute puberulis cum tegmentis medio dorso parcius foliisque subtus dense (juvenilibus etiam supra parce) lepidotis, his demum subtus pallide ferrugineis; foliis biennibus ovalibus v. ellipticis utrinque, basi truncato-apice mucronato-obtusis coriaceis opacis, margine revolutis; corymbis hemisphaericis densis ad 20-floris; floribus breve pedicellatis; tegmentis sub anthesi mox deciduis calyce longioribus rotundatis truncatis margine ciliatis interioribusque dorso sericeis; calyce 5-partito lobis foliaceis ciliatis oblongo-ovatis tubo corollae duplo breviore; corollae flavae subhypocraterimorphae tubo cylindrico leviter recurvo limbum lobis depressorotundis triplo superante intus villosobarbato; staminibus 5 tubo duplo brevioribus filamentis subulatis ad medium pilosis, antheris oblongis; stylo duplo breviore sursum subincrassato; ovario lepidoto 5-mero.

In Chinae prov. Kansu (Przewalski, 1872).

Rh. anthopogoni, Don propius quam *Rh. fragranti*, Maxim., ob folia majora, ramos inordinatos, corollae colorem, sed ab utroque bene distinctum limbo corollae parvo, filamentis pilosis.

coloured and resinous and the fringe always frayed, the whole indumentum compact the midrib elevated and more or less lepidote; petiole about 5 mm. long lepidote. Flowers some 20 in a small dense hemispheric truss with a short puberulous axis; bracts early deciduous outer ones crustaceous fulvous about 6 mm. long and 8 mm. broad more or less rounded carinate mucronulate outside lepidote, margin finely ciliate within puberulous; inner bracts obovate spathulate membranous about 8 mm. long 4 mm. broad outside softly puberulous and at the top lepidote also ciliate at margin with twisted hairs inside puberulous; prophylla about 8 mm. long equalling the calyx filiform and clavate expanded at the top where they are ciliate elsewhere puberulous not lepidote; pedicels about 2 mm. long puberulous and elepidote. Calyx campanulate 5 mm. long cut to beyond the middle, lobes often slightly spreading at top thinly membranaceous green oblong ovate or oblong as much as 2.5 mm. broad acute erose and fimbriate-ciliate outside elepidote inside puberulous. Corolla yellow 1.4 cm. long slightly fleshy with a narrow tube slightly oblique curved forward 8 mm. long in front glabrous outside shaggy and villous inside and at throat dilated upwards expanding into an oblique limb with 5 rounded imbricate slightly crenulate lobes some 3.5 mm. in diam. Stamens 5 about 6 mm. long the filaments dilated downwards and puberulous at base, the anthers oblong and 1 mm. long. Ovary 5-grooved and densely lepidote the scales ultimately sticky about 1.75 mm. long; style claviform green about 1.25 mm. long crowned by a lobed stigma.

Rh. anthopogonoides seems to be nearest to *Rh. clivicolum*, Balf. f. et W. W. Sm. Both of them have yellow flowers, but the puberulous elepidote short pedicels and elepidote calyx, smaller corolla associated with larger leaves distinguish *Rh. anthopogonoides*.

LAPPONICUM SERIES.

The following general characters mark the species in this series :—

Carpet, cushion or dwarf erect shrubs with small leaves usually. Twigs lepidote the scales shortly stalked never losing the disk and becoming setae. Foliage-bud scale-leaves never persistent. Vernation complanate or convolute. The leaves lepidote on both sides, the under indumentum always compact never loose and spongy. Fringe of the scales usually as wide as the umbo and entire. The inflorescence a terminal capitate umbel 1–7-flowered. Flowers small. Flower-bud scale-leaves remaining during flowering. Pedicels very short. Calyx cut to base with membranous lobes varyingly lepidote, puberulous, ciliate or scale-

fimbriate. Corolla usually rose-violet to purple (yellow in only two species), lepidote or glabrous outside; tube usually a short funnel commonly hairy inside; limb open concave. Stamens 5–10 exserted (see two exceptions) with hairy filaments. Ovary lepidote sometimes with hairs also; style glabrous or hairy (lepidote in one species), usually longer than stamens and corolla.

The species that belong to the Lapponicum series are in the following list, and I give the geographical distribution of each as it is known to us:—

Rh. achroanthum, Balf. f.	Yunnan: Chungtien plateau, 12,000–13,000 ft.
Rh. alpicolum, Rehd. et Wils.	Szechwan: Tatsienlu, 12,000–15,000 ft.
Rh. blepharocalyx, Franch.	Szechwan: Tatsienlu.
Rh. capitatum, Maxim.	Kansu.
Rh. chryseum, Balf. f. et Ward.	Tibeto-Yunnan frontier: Ka-gwr-pw Glacier Valley, 13,000–15,000 ft.
Rh. complexum, Balf. f. et W. W. Sm.	Yunnan: Chungtien plateau, 11,000–12,000 ft.
Rh. cuneatum, W. W. Sm.	Yunnan: Lichiang Range, E. flank, 12,000 ft.; Lichiang, 11,000–13,000 ft.; Chungtien plateau, 10,000–11,000 ft.; N.E. of Yangtze bend, 10,000–11,000 ft.
Rh. diacritum, Balf. f. et W. W. Sm.	Yunnan: Chungtien plateau, 13,000–14,000 ft.
Rh. drumonium, Balf. f. et Ward.	Yunnan: Chung River Valley, 10,500 ft.
Rh. Edgarianum, Rehd. et Wils.	Szechwan: Tatsienlu, 11,000–15,000 ft.
Rh. fastigiatum, Franch.	Yunnan: Tali, 11,000–12,000 ft.; Tali, E. flank, 12,000–13,000 ft.; W. flank, 12,000 ft.; summit of Sung Kwei Pass, 11,000–12,000 ft.
Rh. flavidum, Franch.	Szechwan: Tongolo, 11,000–13,000 ft.
Rh. hippophaeoides, Balf. f. et W. W. Sm.	Yunnan; Chung River Valley, 10,500 ft.; W. of Fengkow Valley, 12,000 ft.; Chungtien plateau, 14,000 ft.; N.E. of Yangtze bend, 11,000–12,000 ft.; Lichiang Range, 10,000 ft.

Rh. idoneum, Balf. f. et W. W. Sm.	Yunnan: Chungtien plateau, 13,000–14,000 ft.
Rh. impeditum, Balf. f. et W. W. Sm.	Yunnan: Lichiang Range, W. flank, 12,000–13,000 ft.; E. flank, 15,000–16,000 ft.
Rh. intricatum, Franch.	Szechwan: Tatsienlu.
Rh. lapponicum, Wahlenb.	Greenland; Lapland; Scandinavia; N. Canada.
Rh. nigropunctatum, Franch.	Tibet: Route from Lhasa to Batang.
Rh. nitidulum, Rehd. et Wils.	Szechwan: Muping, 10,000–12,000 ft.
Rh. nivale, Hook. f.	Sikkim; Bhutan.
Rh. oresbium, Balf. f. et Ward.	Tibeto - Yunnan frontier: Doker La, 13,000–15,000 ft.
Rh. parvifolium, Adams.	E. Siberia.
Rh. polifolium, Franch.	Szechwan: Tatsienlu.
Rh. polycladum, Franch.	Yunnan: Tali, Hoching, 9000 ft.
Rh. pycnocladum, Balf. f. et W. W. Sm.	Yunnan: Lichiang Range, E. flank, 10,000–11,000 ft.
Rh. ramosissimum, Franch.	Tibet: between Lhasa and Batang.
Rh. rupicolum, W. W. Sm.	Yunnan: Chungtien plateau, 12,000–13,000 ft.; Kari Pass, Mekong-Yangtze Divide, 12,000–13,000 ft.; Mekong-Yantze Divide, 15,000 ft.; N.E. of Yangtze bend, 13,000–14,000 ft.; Lichiang, W. flank, 14,000 ft.
Rh. scintillans, Balf. f. et W. W. Sm.	Yunnan: Lichiang Range, 11,000–14,000 ft.; Langkong-Hoching Pass, 11,000 ft.
Rh. tapetiforme, Balf. f. et Ward.	Tibeto - Yunnan frontier: Ka-gwr-pw, 15,000 ft.
Rh. telmateium, Balf. f. et W. W. Sm.	Yunnan: Chungtien plateau, 12,000 ft.; Fengkow Valley, 10,000–11,000 ft.
Rh. thymifolium, Maxim.	Kansu.
Rh. verruculosum, Rehd. et Wils.	Szechwan: W. of Kuan Hsien, 10,000 ft.
Rh. Websterianum, Rehd. et Wils.	Szechwan: Tatsienlu, 10,000–15,000 ft.
Rh. violaceum, Rehd. et Wils.	Szechan: W. of Kuan Hsien, 12,000–13,000 ft.

Of the thirty-four species named, only three are known outside of China: *Rh. lapponicum*, *Rh. nivale*, and *Rh. parvifolium*. That we are yet far from knowing all the species of the series we may be certain. Already we have in Edinburgh specimens that do not well fall into any of these described species, but which cannot be described because of the lack of critical parts. The group is a difficult one. To casual observation several of the species resemble one another almost to the degree of identity. Until they can all be studied as living plants there will be unsolved questions about them. At the present time, to my knowledge, the following species are in cultivation:— *Rh. cuneatum*, *Rh. fastigiatum*, *Rh. flavidum*, *Rh. hippophaeoides*, *Rh. idoneum*, *Rh. impeditum*, *Rh. intricatum*, *Rh. lapponicum*, *Rh. nivale*, *Rh. parvifolium*, *Rh. rupicolum*, *Rh. scintillans*. Doubtless there are more, because more than one species has on occasion appeared in one seed pan. There is no little confusion amongst the cultivated forms. *Rh. fastigiatum* covers more than one species. *Rh. Edgarianum* as it has come to us includes two distinct plants, neither of them the right one, and therefore I have omitted it from this garden list. *Rh. intricatum* also is a name including two or three species of our gardens. *Rh. nigropunctatum* is not in the list. I have not seen it either alive or in herbaria, and doubt if it has ever been in cultivation. Rehder and Wilson say that the plant formerly grown under the name is *Rh. intricatum*.

I have seen, thanks to the kind co-operation of M. Lecomte in Paris, types of all Franchet's species excepting *Rh. nigropunctatum* and *Rh. ramosissimum*; I have also seen specimens of all Rehder and Wilson's species, unfortunately only in small amount; Maximowicz enriched our collections many years ago by samples of his species, and along with all these I have had the rich spoil of the exploration by Forrest and Kingdon Ward. If I attempt to sift the characters of the species and to find affinities within the series, it is mainly in the hope of helping cultivators by giving them at least in some cases easily observed marks of distinction by which to recognise their plants. Before proceeding to this analysis it may be helpful if I elaborate the brief outline given above of the characters of the series.

We have in the series carpet-forming species which are well illustrated by the name-species of the series *Rh. lapponicum* and by the Himalayan *Rh. nivale*, plants which live for a greater part of the year under snow, and by *Rh. tapetiforme* and *Rh. drumonium*. Of the taller shrubby forms, *Rh. parvifolium*, *Rh. capitatum*, and others represent those which have elongated tapered leaves of some size. The dwarf cushion habit with gnarled twisted branches is a growth form that is adopted

by a large number of the species, *e.g.*—*Rh. fastigiatum, Rh. impeditum, Rh. scintillans.* I note that many of this type have the discontiguous under-leaf scales. A most graceful growth form is that shown by such plants as *Rh. diacritum, Rh. telmateium, Rh. thymifolium,* which have very thin erect twigs bearing rather small leaves, and these have punctulate under-leaf indumentum.

In relation to cultivation of Rhododendrons in our gardens the series has special interest, for we have, according to the collectors, species which grow in clefts of limestone cliffs—such are *Rh. cuneatum, Rh. pycnocladum,* and *Rh. rupicolum.* Diverse from these in nidus are *Rh. hippophaeoides* (boggy peaty pasture), *Rh. impeditum* (open peaty pasture), *Rh. scintillans* (open marshy pasture), and *Rh. telmateium* (open boggy situations), and then *Rh. diacritum* is said to come from humus-covered boulders. Here, then, are species whose native habitat is definitely recorded —limestone in one set, peat and marsh in the other—and as *Rh. cuneatum* and *Rh. rupicolum* of the lime plants and *Rh. hippophaeoides, Rh. impeditum,* and *Rh. scintillans* of the moist peat plants are in cultivation, comparative experiment upon their growth in relation to soil conditions is possible, and may throw some light upon the problem of "Rhododendrons and lime."

In all the species the short leaf-petiole is erect and is nearly adpressed to the stem so that the lamina stands off from the petiole at a considerable angle. In *Rh. cuneatum* alone do the leaves reach any great size. There they may be 6 cm. long and nearly 2 cm. broad. In the high alpines, *Rh. nivale,* for instance, they are very small—may be only a couple of millimeters across.

The tint of the actual leaf surface above is dark green, beneath it is paler because there the epidermis always produces papillae coated with small particles of wax,* and these may give a glaucous look to the surface. The real tint of the leaf is obscured because both surfaces are covered with peltate scales forming an indumentum. The general construction of these scales is alike in all. There is a short stalk of several cells, often in two vertical rows, and this stalk expands above into a many-celled umbo, from the margin of which there extends all round a fringe of empty cells so connected as to run together to the margin of the fringe and to end altogether there, so that the edge is smooth and not toothed. The fringe is radially as broad as the umbo. This umbo may contain a resin-like excretion, which may become tinted yellowish, amber-coloured, or red, and is then glistening, or it may remain unmarked by change in content, and then the surface of the umbo is not glistening or sometimes the point

*As Mr. Tagg, Assistant in our Museum, who is studying indumenta of Rhododendrons, points out.

where the umbo passes into the fringe becomes tinted and there appears to be a ring of resin-like substance. The fringe itself may remain uncoloured and whitish, or it may change to a brown colour—the cell-walls here altering. These scales are at first whitish all over, both on top of and below the leaf lamina. The scales on the upper surface are almost superficial. By that I mean they are not sunk in deep pits. The upper leaf-surface may be undulate and the scales may come off from the depressions, but they are always raised above the surface so that the fringe spreads more or less horizontally over it. These scales may shrivel up on the old leaves remaining as a greyish debris making the surface somewhat hoary, or may fall off and leave only a trace of their existence in the undulation of the surface or in greyish shreds, or they may, if the umbo becomes resinous, remain as scintillating disks spread over the surface. As to how far the difference is to be regarded as associated with any particular environment or as a specific character there is insufficient evidence.

The form and distribution of the scales on the under-leaf surface furnishes a mark of much value in the diagnosis of species. The scales of the mould already mentioned may be *contiguous* or *discontiguous*. The area of exposed leaf epidermis where the scales are discontiguous is about the same as, or more than, that of the scales. There are states when the scales are not quite contiguous and there are left narrow chinks between the scales. For purposes of description this state is treated as contiguous. Where the scales are contiguous the fringes of adjacent scales may not merely touch but overlap in an imbricate fashion. By this character of contiguity or discontiguity of scales we can at once diagnose groups of species. Where the scales are contiguous they are essentially superficial; where discontiguous they are sunk in pits, and this sinking affects the appearance of the scale—because if the pit be deep the length of the stalk of the scale may be less than the depth of the pit; the umbo of the scale is then depressed and the fringe may be turned upwards and only slightly overlap the leaf-surface. Such sunk scales are readily recognised. The evident function of all scales is water conservation through the layer of still air they maintain over the leaf-surface. The wax-bearing epidermal papillae appear to be much better developed in the discontiguous species than in the contiguous ones.

There are yet other interesting features to notice of this indumentum on the under-leaf surface. In some cases the contiguous scales are large and all of about the same form, size, and colour, and their imbrication gives the effect that one observes in such scale-covered leaf-surfaces as occur in Elaeagnus,

species of Croton, and others. This is well represented in *Rh. cuneatum*, *Rh. hippophaeoides*, *Rh. idoneum*, *Rh. intricatum*, *Rh. polifolium*, *Rh. tapetiforme*, *Rh. Websterianum*. One speaks of the scales as *uniform* or concolorous. The surface may be grey-coloured, or if the scales are tinted brown it becomes a bright brown or a rusty brown. But in some cases, *e.g.*, *Rh. achroanthum*, *Rh. capitatum*, *Rh. chryseum*, *Rh. rupicolum*, about half of the scales equally distributed over the leaf-surface become tinted brownish and are intermixed with the other half, which remain whitish or grey-green. There appear to be two kinds of scale. But the scales are all of the same build; it is in the coloration that there is difference, and also in the stalks, which in the brown scales are a little longer and the scale-disks are therefore projected somewhat beyond their untinted fellows. And then we pass to species in which only a few of the scales develop longer stalks and become brown, as in *Rh. diacritum*, *Rh. drumonium*, *Rh. nigropunctatum*, *Rh. nivale*, *Rh. pycnocladum*, *Rh. telmateium*, *Rh. thymifolium*, and others, so that the greyish or brownish leaf-surface is picked out with dark brown spots—it is *punctulate*. We speak of the scales in the two cases last described as *biform* or bicoloured. What functional meaning, if any, there is in the modification is not evident, unless it be that the projection of many or few of the contiguous scales secures more free communication between the stomata and the atmosphere—a suggestion the validity of which is questioned by the occurrence of like disposition on leaf-surfaces where the scales are discontiguous. Leaf under-surfaces with discontiguous scales may appear grey or tinted brown or brown mixed with green. The grey and green of the surface depends upon the area of surface exposed between the scales and the development of wax on the epidermal papillae; the brown tint is a consequence of the coloration of the scales.

Examination of dried specimens and of the few species that are in cultivation tells me that this indumentum character of the old leaves is a good basal one of definition.

The twigs of all the Lapponicum Rhododendrons are alike. They may be longer or shorter, but are all coated with a rusty indumentum of peltate scales which peal off like scurf.

In no one of the Lapponicum series have I found on the stems and petioles the very long-stalked peltate scales which lose sooner or later their disk—the stiffened stalk becoming thereafter a longer or shorter seta. These setulose scale-stalks are well developed in the Anthopogon, Fragrans, and Cephalanthum series. See what I say on p. 318. In this Lapponicum series the scale-remnant sometimes forms a little wart on the branchlets before the grey bark begins to shred off, but that is all.

The foliage-buds are all small, more or less oblong, with two or three small thick rusty lepidote scale-leaves outside and spathulate thinner ones within. The scale-leaves fall off at once on opening of the bud. None of them persist. The ptyxis of the leaves in the bud is involute or they may be plane, and the vernation is correspondingly implicate or complanate. This character in the bud is a tribe distinction of all these small-leaved Rhododendrons, marking them off from the whole of the large-leaved Rhododendrons, which have revolute ptyxis and a curious valvate vernation of the leaves within a hollow chamber formed by the numerous scale-leaves of the bud.

The flowers are produced at the end of shoots either as solitary terminal flowers with hardly any stalk, or in groups of 2–7 flowers equally and short-stalked. Where there are several flowers at the end of a twig they belong to one truss; there are never lateral accessory trusses or flowers. This is important, separating the group from *Rh. dauricum*, Linn. and forms within its orbit. There may be considerable variation in the number of flowers in a truss in the same species, but apparently some species have constantly a solitary terminal flower, *e.g.*, the whole of the species in sub-series B (see p. 309)..

In all cases the flower-bud is more or less globose, the outermost sterile bracts very small ovate and lepidote, the ones within more or less rounded and hooded, mucronate or apiculate or not, lepidote outside and ciliate or lanate at margin and top. Variations there are, and investigation must determine whether any point of diagnostic value is to be found in these sterile bracts. They are always more or less persistent until flowering is well over. The innermost spathulate more or less hairy bracts are also wonderfully uniform, as are also the thread-like bracteoles usually longer than the pedicels, which are commonly lepidote, often reddened.

In the flowers themselves the calyx is always cut to near the base into five lobes which are equal or unequal. If the latter, the postero-lateral are the larger. There is much variation in the size of the lobes. Sometimes the smaller are mere points. The larger may be membranous plates 5 millimeters long. They are green or reddened, may be lepidote on the back and margin, and ciliate or lanate at the margin. As Rehder and Wilson have pointed out, forms like these Lapponicum Rhododendrons with sterile bracts remaining during flowering are apt to show divergence within a species in the calyx. One may recognise its oneness for the group, and that certain species have generally say large calyx lobes, others have small ones, but we do not yet know the limits of specific character in the calyx.

It is otherwise with the corolla. It shows a short funnel-

like tube in most species, and it opens into a broad funnel limb with five usually crenulate lobes spreading wide open in full flower—the lobes as long as the rest of the corolla, but in three species—*Rh. blepharocalyx*, *Rh. complexum*, and *Rh. intricatum*—the tube is elongated cylindric ventricose at base, constricted at the mouth, and the limb is nearly patent. So distinct is this that the right of these species to a position within the series may be doubted. They form a small group intermediate between the Lapponicum and the Cephalanthum series. The colour varies from rose-pink to purple and violet; in *Rh. chryseum* and *Rh. flavidum* it is yellow—an interesting contrast with the Cephalanthums, in which yellow and white are the dominant colours. The corolla is always lined inside by hairs and two states have to be recognised. The stamens in the funnel flowers project far beyond the mouth of the corolla tube, which is plugged by a mass of hairs in part derived from the corolla tube, in part from the staminal filaments. In the flowers with elongated corolla tube the stamens do not or hardly project from the tube, and no hairs are visible in the open flower. The two states are noticeable at sight. There remains one character of the corolla to notice which is a thoroughly good differentiating one. Some species have the corolla lepidote outside right from the corolla tube to the top of the lobes—sometimes slightly, other times copiously. It is a character I trust. The species in which the lepidote corolla occurs are:—

Rh. achroanthum, Balf. f.
Rh. chryseum, Balf. f. et Ward.
Rh. cuneatum, W. W. Sm.
Rh. diacritum, Balf. f. et W. W. Sm.
Rh. drumonium, Balf. f. et Ward.
Rh. flavidum, Franch.
Rh. idoneum, Balf. f. et W. W. Sm.
Rh. pycnocladum, Balf. f. et W. W. Sm.
Rh. rupicolum, W. W. Sm.
Rh. telmateium, Balf. f. et W. W. Sm.
Rh. verruculosum, Rehd. et Wils.

In the few cases where the number of the stamens is 5 it seems to be a definite mark for diagnosis. Fluctuations from 8–10 are so common that these higher figures are of no diagnostic import. There are differences in the breadth of the filaments which in dried specimens seem to suggest a differential character, but further investigation must determine this. All the Lapponicum Rhododendrons have hairs upon the filaments. The portion of the filament from the upper third of the ovary downwards is commonly slightly broader and bare of hairs, the region immediately above this and therefore encircling the top of the

ovary is always more or less hairy—frequently each filament has a villous tuft there which projects over the ovary into the tube of the corolla. But the hairs may be few in number or they may spread up the filament to near the top (*Rh. capitatum*). In most of the series the stamens are about equal in length to the corolla—longer or shorter—but in the forms with elongated corolla tube circling round *Rh. intricatum*, Franch. they are not longer than the corolla tube, and there show most markedly the apparent obdiplostemony of so many Ericaceae.

The ovary in all cases is lepidote, but not only so, it may be also pilose. This pilosity is a fluctuating feature. In all cases the top of the toral disk at the base of the ovary is more or less pilose. The hairs may extend upwards over the ovary amongst the scales to the top in a varying degree. Sometimes (*Rh. achroanthum*) they obscure the scales; at other times are hardly visible. From the ovary the hairs may extend to the style nearly through half its length. On the same plant in some a style pilose and one epilose may be found. Yet at times the character is useful. The length of the style in relation to the ovary is of importance. In the forms where the stamens are not exserted from the corolla tube the style is always shorter than the stamens—it may be shorter than its ovary. In forms with long stamens the style may be about equal to them—longer or shorter. Then there is the majority of forms with style consistently much longer than the stamens.

The fruit, apart from variation in size, has the same type in all species of Lapponicum Rhododendron where it is known—an ovoid capsule dehiscing by five woody valves to the base.

Here follows an attempt to arrange the species in grouplets for the purpose of facilitating recognition of them by easily observed characters. The arrangement in sub-series and the keys seem to work all right in relation to dried specimens, and so far as I have tested they are effective for the few species in cultivation. They seem to bring together more or less the nearly allied species. But they are tentative.

SUB-SERIES A.

Scales of under-leaf indumentum brown, uniform, truly discontiguous. The species

Rh. fastigiatum, Franch.,
Rh. flavidum, Franch.,
Rh. impeditum, Balf. f. et W. W. Sm.,
Rh. oresbium, Balf. f. et Ward,
Rh. scintillans, Balf. f. et W. W. Sm.,
Rh. verruculosum, Rehd. et Wils.,
Rh. complexum, Balf. f. et W. W. Sm.,

may be taken together as forming a sub-series marked by this character of the under-leaf indumentum. The brown scales are truly discontiguous, having conspicuous bare epidermal areas. Let me make quite clear that the area without scales is large, hence the scales are as it were dotted at intervals over the surface, and that the old leaves must be looked at. The leaves in the species of this series vary from elliptic to oblong, and form-differences are useful to distinguish between closely related species; for instance, *Rh. impeditum* has the elliptic type, *Rh. scintillans* the oblong. The flowers in the truss are as a rule few—3–5 in *Rh. fastigiatum*, the largest number, 1 only in *Rh. verruculosum*. Some tint of violet or purple marks the flowers, save in *Rh. flavidum*, where they are yellow. Scales on outside of corolla is an excellent differential mark. Three species have this—*Rh. fastigiatum*, *Rh. flavidum*, *Rh. verruculosum*. I know of no more useful mark than this for distinguishing *Rh. fastigiatum* amongst like forms. Any plant with more than one flower in the truss and with lepidote corolla and that shows discontiguous uniform scales below is *Rh. fastigiatum*. The character will enable anyone to separate out this species from others which are commonly mixed with it in gardens. The 10 exserted stamens and the style longer than the stamens are common marks, with the exceptions of 7–8 stamens in *Rh. verruculosum* and a puberulous style shorter than the stamens in *Rh. oresbium*. *Rh. complexum* is really not in its natural place here, for it has a long tube to the corolla and only 5 stamens which with the style are included, and these are foreign to the Lapponicum group.

KEY TO THE SPECIES.

1.	Corolla lepidote	2.
	Corolla elepidote	4.
2.	Flowers yellow	*flavidum.*
	Flowers purple tinted	3.
3.	Inflorescence 1-flowered	*verruculosum.*
	Inflorescence 3-5-flowered	*fastigiatum.*
4.	Stamens and style included in corolla tube	*complexum.*
	Stamens and style exserted	5.
5.	Style hairy, shorter than stamens	*oresbium.*
	Style glabrous, longer than stamens	6.
6.	Leaves elliptic, rounded at each end	*impeditum.*
	Leaves oblong, narrowed at each end	*scintillans.*

Of the species named here the following are to my knowledge in cultivation :—*Rh. fastigiatum*, *Rh. flavidum*, *Rh. impeditum*, *Rh. scintillans*.

SUB-SERIES B.

Scales of the under-leaf indumentum contiguous grey or pale brown, surface punctulate with a few darker scales.

This sub-series of the Lapponicums may be termed the punctulate. It contains :—

Rh. alpicolum, Rehd. et Wils.
Rh. diacritum, Balf. f. et W. W. Sm.
Rh. drumonium, Balf. f. et Ward.
Rh. nigropunctatum, Franch.
Rh. pycnocladum, Balf. f. et W. W. Sm.
Rh. telmateium, Balf. f. et W. W. Sm.
Rh. thymifolium, Maxim.

These are all I believe near allies, with perhaps the exception of *Rh. pycnocladum*, which I place here because it shows the character by which all the others are marked—contiguous scales of the under-leaf indumentum with punctulation. This character is an easily recognised one, and I am sure will be of use to cultivators in identifying their plants. There is one other plant which shows the character—the Himalayan *Rh. nivale*, Hook. f.,—but I do not include it here because its habit and other features show it is not really an ally of these other species. It is better taken in a section of high alpines, to which I refer hereafter. The fundamental character of punctulation gave origin to Franchet's naming of *Rh. nigropunctatum*. All the species in this group are small shrublets with erect thin twigs and small ovate, or elliptic, or oblong, or lanceolate leaves. *Rh. pycnocladum* is an exception, being a cushion shrub, after the fashion of *Rh. impeditum* and its fellows. The ground-work of under-leaf indumentum is composed of uniform contiguous shining scales which give a greyish or yellowish-grey or pale leather-coloured tint to the whole surface, and upon it the brown punctulations show up. *Rh. pycnocladum* has a bright brown ground-work. The trusses are invariably 1-flowered, and the corolla always of a tint of rose-violet to violet and purple, is lepidote in more than half of them—*Rh. diacritum, Rh. drumonium, Rh. polycladum, Rh. telmateium*. The stamens are 10 (8–10 in *Rh. alpicolum* and *Rh. drumonium*) and always along with the style exserted. In two species only is the glabrous style (hairy in *Rh. alpicolum*) shorter than the stamens, namely, *Rh. alpicolum* and *Rh. thymifolium*.

KEY TO THE SPECIES.

1.	Corolla lepidote	2
	Corolla elepidote	5.
2.	Style glabrous, equalling stamens . . .	*drumonium*.
	Style glabrous, longer than stamens	3.

3.	Leaves dark green above, bright brown below	*pycnocladum.*
	Leaves hoary above, yellow-grey below	4.
4.	Leaves oblong or oblong elliptic	*diacritum.*
	Leaves narrowly lanceolate	*telmateium.*
5.	Style hairy	*alpicolum.*
	Style glabrous	6.
6.	Style longer than stamens	*nigropunctatum.*
	Style shorter than stamens	*thymifolium.*

Rh. telmateium is the only one of these that is in cultivation. The plant met with in cultivation under the name *Rh. nigropunctatum* is not *Rh. nigropunctatum,* Franch.

The species of the Lapponicum series in which the scales of the under-leaf indumentum are contiguous without sporadic punctulation, or stand so close together as to leave only narrow chinks uniformly or here and there through which the epidermal surface can be seen, are the majority. One may, however, to assist recognition, segregate them in smaller sub-series.

SUB-SERIES C.

Scales of under-leaf indumentum grey or yellowish-grey, contiguous, uniform, forming a shining surface.

This first sub-series I mention is one in which the under-leaf indumentum is composed of truly contiguous, even imbricate, scales which are shining, of a grey or perhaps slightly yellowish tint. This gives the whole surface a uniform coloration in marked contrast with the green upper surface. The species that come into this category are :—

Rh. blepharocalyx, Franch.
Rh. hippophaeoides, Balf. f. et W. W. Sm.
Rh. idoneum, Balf. f. et W. W. Sm.
Rh. intricatum, Balf. f. et W. W. Sm.
Rh. polifolium, Franch.
Rh. Websterianum, Rehd. et Wils.

Of these *Rh. hippophaeoides, Rh. idoneum, Rh. polifolium,* and *Rh. Websterianum* are true members of the Lapponicum series. The first and last very much like in general facies—twiggy hoary shrubs of some size, the former often with long virgate shoots—*Rh. idoneum* a smaller cushion shrub, *Rh. polifolium* an erect twiggy shrub with thin branches resembling much *Rh. thymifolium,* Maxim., but that species has punctulate indumentum. Here I interpolate :—When Franchet says of *Rh. polifolium* "*Rh. thymifolio,* Maxim. affine ; ab illo differt gemmis nec unifloris nec ad apicem solitariis, sed constanter 2 vel 3 glomeratis et saepe bifloris," he does not mean, as the type specimens show,

that there is here as in *Rh. dauricum*, Linn. a fascicle of 2-3-flowered umbels at the end of one shoot. The construction is as in others of the Lapponicum series, only here the leafy shoots which end in flower trusses are short and many at the end of the branches, and give somewhat the appearance of an aggregation of umbels. *Rh. blepharocalyx* (which differs from *Rh. intricatum* in having 5 stamens and style shorter than the ovary) and *Rh. intricatum* are included here because of their indumentum. As I have explained under *Rh. complexum* they have a corolla altogether different from the Lapponicums, approaching that of the Anthopogons, the Fragrans, the Cephalanthums. In this sub-series we pass from 2–3-flowered inflorescences, as in *Rh. idoneum*, *Rh. polifolium*, and *Rh. Websterianum*, to 6–7-flowered ones in *Rh. hippophaeoides*. 6–7-flowered trusses occur also in *Rh. blepharocalyx* and *Rh. intricatum*. The corolla is some tint of rose-purple to a purple or light blue, and is lepidote only in *Rh. idoneum*. 10 stamens are the rule, 8–10 in *Rh. hippophaeoides*. The style glabrous (in *Rh. Websterianum* sometimes lepidote) is longer than the stamens in *Rh. idoneum* and *Rh. Websterianum*, in the others shorter; in *Rh. intricatum* only about as long as the ovary, in *Rh. blepharocalyx* shorter than the ovary.

KEY TO THE SPECIES.

1.	Corolla lepidote	*idoneum*.
	Corolla elepidote	2.
2.	Stamens and style included in corolla tube	3.
	Stamens and style exserted	4.
3.	Style equalling ovary in length. Stamens 10	*intricatum*.
	Style much shorter than ovary. Stamens 5	*blepharocalyx*.
4.	Inflorescence 6-7-flowered	*hippophaeoides*.
	Inflorescence 2-3-flowered	5.
5.	Calyx coriaceous under 2 cm. long. Style glabrous	*polifolium*.
	Calyx membranous 4 mm. long. Style lepidote	*Websterianum*.

Of these species I know in cultivation :—*Rh. idoneum*, *Rh. intricatum*, *Rh. hippophaeoides*.

SUB-SERIES D.

Scales of under-leaf indumentum large, uniform, and concolorous, contiguous or nearly so, surface never white but fulvous to rufous. Never punctulate.

I associate in a sub-series by themselves three species in which the under-leaf indumentum consists of contiguous, uniform, concolorous scales, but the whole surface is not bright grey or yellowish-grey and shining, but has a more uniform brown tint, even bright cinnamon, through all the scales becoming coloured alike. There is no sporadic punctulation nor is there

an intermixture about equal of dark brown and paler scales. The species showing this character are :—

Rh. cuneatum, W. W. Sm.
Rh. nitidulum, Rehd. et Wils.
Rh. tapetiforme, Balf. f. et Ward.

Rh. tapetiforme is, as its name suggests, a carpet-forming species ; the others are shrubs, in the case of *Rh. cuneatum* as much as 1.5 m. high. *Rh. cuneatum* is the largest leaved and largest flowered species in the whole Lapponicum series, and the larger leaves, as much as 6 cm. long, often do not suggest the series at all. But it has often quite small leaves, and I think it finds its right place in the series. *Rh. nitidulum* gets its name from the glistening, amber-coloured scales on the upper-leaf surface—a feature well seen also in *Rh. scintillans* of the discontiguous scaled group, and in others occasionally. The flower trusses are 1–2- or 3-flowered. The flower colour, bright rose in *Rh. tapetiforme*, rose lavender in *Rh. cuneatum*, is violet purple in *Rh. nitidulum*. Stamens are 10. The style, glabrous in all, is longer than the stamens in *Rh. cuneatum* (very long) and *Rh. nitidulum*, equalling them in *Rh. tapetiforme*.

KEY TO THE SPECIES.

1. Corolla lepidote. Leaves 3–6 cm. long . . *cuneatum*.
   Corolla elepidote. Leaves 2 cm. long . . . . 2.
2. Flowers rose. Style equalling stamens . . *tapetiforme*.
   Flowers violet purple. Style longer than stamens . . . . . *nitidulum*.

Rh. cuneatum alone of this group is in cultivation, and of its right to a position here I am in some doubt.

SUB-SERIES E.

Scales of under-leaf indumentum contiguous or nearly so, relatively large, bicolorous, dark brown or rufous and pale coloured intermixed usually equally.

A number of the species of the Lapponicum series, including *Rh. lapponicum*, Wahlenb. itself, which have contiguous scales on the under-leaf surface show a fulvous tint there which contrasts with the bright grey or yellowish-grey seen in many other species of the series. The cause of this is that the scales are of two colours—some of them brown and these more prominent, others of them remaining a pale grey-green. Often, too, the scales may not be quite contiguous, leaving chinks through which the epidermal surface is visible. These bicolour scales are about equally intermixed in very old leaves, the dark brown which are more projected from the surface may be more numerous.

This is very different from the punctulation found in sub-series B. The species showing the character I mention are :—

Rh. achroanthum, Balf. f. et W. W. Sm.
Rh. capitatum, Maxim.
Rh. chryseum, Balf. f. et Ward.
Rh. lapponicum, Wahlenb.
Rh. parvifolium. Adams.
Rh. polycladum, Franch.
Rh. rupicolum, W. W. Sm.
Rh. violaceum, Rehd. et Wils.

I think that the species thus brought together may be regarded as more nearly allied to one another than to other species, but the specific differences are marked. In habit they range from prostrate shrubs like *Rh. lapponicum* to erect shrubs of a meter high or more. *Rh. chryseum* is said to be a " dwarf." The flower trusses are most usually 3–5-flowered. In *Rh. lapponicum* 1-flowered. In *Rh. violaceum* 1–3-flowered. In *Rh. chryseum* and *Rh. parvifolium* 6–7-flowered. Flower colour is distinctive in some species—some shade of violet purple in most of them ; it is a dark almost purple black in *Rh. rupicolum*, rose in *Rh. capitatum* and *Rh. achroanthum*, yellow in *Rh. chryseum*. Lepidote corollas characterise *Rh. achroanthum*, *Rh. chryseum*, and *Rh. rupicolum*. The stamens are 5 in *Rh. achroanthum* and *Rh. chryseum*, 5–6 in *Rh. lapponicum*, 8–10 in *Rh. capitatum* and *Rh. rupicolum*, 10 in all the others. The style always exserted and longer than the stamens is glabrous in *Rh. lapponicum*, *Rh. polycladum*, *Rh. parvifolium*, and *Rh. violaceum*.

KEY TO THE SPECIES.

1.	Corolla lepidote	2.
	Corolla elepidote	4.
2.	Flowers yellow	*chryseum*.
	Flowers rose or purple tinted	3.
3.	Corolla rose. Stamens 5	*achroanthum*.
	Corolla black purple. Stamens 10	*rupicolum*.
4.	Leaves oblong or sublanceolate, narrowed to each end	5.
	Leaves ovate to elliptic, rounded at each end	7.
5.	Style hairy, longer than stamens	*capitatum*.
	Style glabrous, longer than stamens	6.
6.	Inflorescence 1-flowered	*lapponicum*.
	Inflorescence 3-5-flowered	*polycladum*.
	Inflorescence 6-7-flowered	*parvifolium*.
7.	Inflorescence 1-flowered. Stamens 5-6	*lapponicum*.
	Inflorescence 1-3-flowered. Stamens 8-10	*violaceum*.

Cultivated species of the foregoing are :—*Rh. chryseum*, *Rh. lapponicum*, *Rh. parvifolium*.

SUB-SERIES F.

Shrubs with very small, thick, rounded, even orbicular, leaves. Upper-leaf surface dark green, with withered contiguous scales amber-coloured shining. Under-leaf scales contiguous, sometimes bicolour and punctulate. Inflorescence 1-flowered. Corolla elepidote. Style glabrous.

The species

Rh. Edgarianum, Rehd. et Wils.,
Rh. nivale, Hook. f.,
Rh. ramosissimum, Franch.,

are perhaps allied species within the Lapponicum series. I confess, however, that I do not know much of either *Rh. Edgarianum* or *Rh. ramosissimum*, and grouping them as I do is yielding to the consideration that they seem more like in leaf form to one another than to other species in the Lapponicum series, and it is convenient for practical identification so to arrange them. We have only two small specimens of the former in the Edinburgh Herbarium under Wilson No. 1319, and none of the latter. *Rh. nivale* is a dwarf, prostrate, carpet shrub only a few inches high, the others are small bushes. All three species have very small leaves, rounded or approaching the orbicular, with contiguous amber coloured scales above, some of them becoming quite brown. Beneath the scales are also contiguous in *Rh. Edgarianum* and *Rh. ramosissimum*, rufous not punctulate or sometimes a portion remains greenish ; in *Rh. nivale* the majority are pale fulvous brown whilst the others are very dark brown, and if there are very few the aspect of the surface is somewhat punctulate. Solitary terminal flowers are in all of them, and the corolla is elepidote rose and rose purple to purple. The form of the corolla in *Rh. Edgarianum* and *Rh. nivale*, in which only I have seen it, seems to argue against placing them together, for in *Rh. nivale* it has a short cylindric tube with a close villous throat annulus, but is funnel shaped, with a pubescent throat in *Rh. Edgarianum*. Taking Franchet's description of *Rh. ramosissimum*, " corolla fauce pilis destituta poculiformis," we have a suggestion of a very different corolla. I have not had opportunity of dissecting a flower of true *Rh. ramosissimum* as described by Franchet, but I have examined one from Wilson's plant No. 1319, ascribed to *Rh. ramosissimum*, Franch. In it there is quite a long (for the Lapponicum group) tube villous at the throat. Then Rehder and Wilson say purple for colour not rose as Franchet gives it, and further their plant is tall, Franchet's

"humilis." Rehder and Wilson's is an interesting plant with foliage that would well suit the grouping I make, which must be taken however as having no special reference to Rehder and Wilson's plant. *Rh. nivale* has 10 stamens; 8 only are described in the other species, though I found 10 in a flower of Rehder and Wilson's plant. The style is particularly long in *Rh. nivale*, exceeding the stamens, as also in *Rh. Edgarianum*, but is shorter in *Rh. ramosissimum*. The capsule, as might be expected in the very high alpine *Rh. nivale*, seems to be much larger than in *Rh. Edgarianum*.

KEY TO THE SPECIES.

Erect shrub with thick intricate branches.
  Under-leaf surface rufous not punctulate. Corolla rose purple to purple, tube funnel-shaped, throat pubescent. Stamens 8-10. Style longer than stamens . . . *Edgarianum*.

Prostrate carpet shrub with thick intricate branches. Under-leaf surface brown, punctulate. Corolla red purple, throat villous. Stamens 10. Style longer than stamens . . . . . *nivale*.

Humble shrub with intricate branches. Under-leaf surface fulvously lepidote not punctulate. Corolla cup-shaped, rose, throat glabrous. Stamens 8. Style shorter than stamens . . . *ramosissimum*.

Rh. nivale only is in cultivation to my knowledge. Plants under the name *Rh. Edgarianum* are in gardens, but I have not found any plants so-called correspond to Rehder and Wilson's description.

CEPHALANTHUM SERIES.

The type of Rhododendron exhibited by *Rh. cephalanthum*, Franch. has been known to us otherwise only in *Rh. Sargentianum*, Rehder et Wilson from West Szechwan. Now, owing to the exploration of Forrest and of Kingdon Ward, we discover that the type has a remarkable development in West Yunnan and the bordering region of East Burma and Tibet. A dozen species have to be added. Taking for the group the name Cephalanthum from the oldest described species, the species composing it with their distribution is given in the following table :—

Rh. acraium, Balf. f. et W. W. Sm.	Yunnan : Chungtien plateau, 12,000–13,000 ft.
Rh. cephalanthoides, Balf. f. et W. W. Sm.	Yunnan : Lichiang, 12,000–13,000 ft.

Rh. cephalanthum, Franch.	Yunnan: Tali Range, E. flank, 10,000-12,000 ft.
Rh. chamaetortum, Balf. f. et Ward.	Tibeto-Yunnan frontier: Kagwr-pw Glacier Valley, 15,000 ft.
Rh. gymnomiscum, Balf. f. et Ward.	Tibeto-Yunnan frontier: Kagwr-pw Glacier Valley, 14,000 ft.
Rh. hedyosmum, Balf. f.	Szechwan ?
Rh. ledoides, Balf. f. et W. W. Sm.	Yunnan: N.E. of Yangtze bend, 13,000 ft.
Rh. lepidanthum, Balf. f. et W. W. Sm.	Yunnan: Lichiang, 11,000–14,000 ft.
Rh. nwaiense, Balf. f. et Ward.	E. Upper Burma: Nwai Divide, 12,000–13,000 ft.
Rh. platyphyllum, Balf. f. et W. W. Sm.	Yunnan: Tali Range, E. flank, 10,000–11,000 ft.
Rh. praeclarum, Balf. f. et Farrer.	Kansu.
Rh. radinum, Balf. f. et W. W. Sm.	Yunnan: Lichiang, 11,000–12,000 ft.
Rh. Sargentianum, Rehder et Wilson.	W. Szechwan, 10,000–14,000 ft.
Rh. sphaeranthum, Balf. f. et W. W. Sm.	Yunnan: Fengkow Valley, 12,000–13,000 ft.

Excepting *Rh. cephalanthum* and *Rh. Sargentianum* all the species are described in the preceding pages.

All these are dwarf, shrubby, aromatic plants with small (with but few exceptions) repand leathery leaves, dark green above and with a lax (spongy) never blood-red scale indumentum below; and they show general uniformity in the form of the foliage-bud scale-leaves persistent or deciduous, the complanate or convolute vernation with bright yellow young parts, the bistrate (long and short) indumentum of scales the longer of which lose their disks and become setae, the dense capituliform inflorescences with overlapping deciduous bracts and conspicuous bracteoles, the small green or reddish calyx cut to the base usually, the tubular oblique corolla tube often long and villous inside usually bearded at the mouth, the included stamens glabrous or puberulous, the short lepidote ovary and style never much longer than the ovary but often shorter. Of the fruit we know little—where known it is a lepidote capsule invested by the calyx and dehiscing to the base.

The whole series has affinity with the series of Anthopogons and of Fragrans. Franchet in the description of *Rh. cephalan-*

thum cited below refers to the relationship and points out the diagnostic feature of the indumentum of the leaf under-surface. This character is a valuable differential one and easily observed. I speak of the indumentum in the Cephalanthum series as spongy because of its loose character and it is never blood-red. In the Fragrans series it is compact and never blood-red. In the Anthopogon series it is agglutinated and always blood-red.

We have to learn a good deal more of these species before a comprehensive story of the Cephalanthum series can be written. Meanwhile I give the following tentative key of differential characters. The material for examination of most of the species is not abundant, and may be found hereafter to have been inadequate for a true picture of the species described without, however, upsetting the specific determinations.

KEY TO THE SPECIES.

1. Under-leaf indumentum spongy . . . . . 2.
   Under-leaf indumentum loose but hardly spongy . . . . . 12.
2. Perulae persistent . . . . . 3.
   Perulae deciduous . . . . . 7.
3. Corolla lepidote . . . . . 4.
   Corolla elepidote . . . . . 6.
4. Pedicels none. Flowers rose-tinted . . *radinum.*
   Pedicels 7-8 mm. long lepidote . . . . 5.
5. Stamens hairy. Flowers white . . . *lepidanthum.*
   Stamens glabrous. Flowers pale yellow . . *Sargentianum.*
6. Leaves 5 cm. long. Bracteoles longer than calyx. Flowers cream-coloured . . *platyphyllum.*
   Leaves 4 cm. long. Bracteoles shorter than calyx. Flowers white . . . *cephalanthum.*
7. Corolla hairy outside . . . . . 8.
   Corolla glabrous outside . . . . . 9.
8. Bracteoles shorter than calyx. Inflorescence axis elepidote. Flowers white. Stamens glabrous . . . *cephalanthoides.*
   Bracteoles much longer than calyx. Inflorescence axis lepidote. Flowers rose-tinted. Stamens hairy . . . . *sphaeranthum.*
9. Stamens glabrous . . . . . 10.
   Stamens hairy . . . . . 11.
10. Flowers white. Calyx setulose-ciliate . . *hedyosmum.*
    Flowers bright yellow. Calyx scale-fimbriate . . . . . *praeclarum.*
11. Inflorescence axis lepidote. Calyx eciliate . *acraium.*
    Inflorescence axis puberulous. Calyx ciliate . . . . . *ledoides.*

12.	Perulae persistent	13.
	Perulae deciduous. Pedicels glabrous. Corolla yellow, glabrous outside . .	*gymnomiscum*
13.	Pedicels lepidote. Calyx scale-fimbriate. Corolla yellow, glabrous outside . .	*nwaiense.*
	Pedicels hairy. Calyx ciliate. Corolla pink, lepidote outside	*chamaetortum.*

The following are in cultivation :—*Rh. cephalanthoides, Rh. cephalanthum, Rh. hedyosmum, Rh. ledoides, Rh. Sargentianum, Rh. sphaeranthum.*

Rh. cephalanthum, Franch. was described by Franchet in 1885,* and subsequently in 1886† Franchet supplemented his description. The plant has been in cultivation for several years, introduced, I suppose, through the French missionaries. It has not yet been figured, and I do not know of a description of it other than Franchet's original one. It may be of use, therefore, if I give a description here drawn from the plant as it has grown and flowered for some years past in the Royal Botanic Garden :—

Rh. cephalanthum.—Small shrub about 6 cm. high feathered to the ground with short stoutish erect branches annual growths about 4 cm. long. Twigs of the year pale yellow scurfy with an abundance of pale yellow peltate scales on long stalks raising them from the pale green surface of the branch which is coated by a stratum of shorter-stalked peltate scales; the disk of the long scales has a broad umbo and its equally

* Franch. in Bull. Soc. Bot. France, xxxii (1885), 9. Franchet's description runs :—

Rhododendron cephalanthum, sp. nov.—Pedale vel sesquipedale, ramosum, cortice ramorum anni praeteriti cinereo ; facile detersili, ramulis hornotinis breviter setuloso-glandulosis. Folia obovato-oblonga, in petiolum 5–6 mill. longum attenuata, supra intense viridia, asperata, subtus dense lepidota, quamis elevatis, fuscis ; perulae ovatae, ciliolatae, juvenilibus lepidotis. Flores 8–15 ad apicem ramorum dense congesti ; calyx breviter pedicellatus, bracteola lineari stipatus, membranaceus, lepidotus, campanulatus, ad medium vel paulo ultra 5-lobus, lobis inaequalibus margine ciliatis, nunc apice rotundatis, nunc subacutis ; corolla alba, glabra ; tubus cylindricus, calyce vix duplo longior (1 cent. circiter longus), intus dense villosus ; limbus explanatus tubo subduplo brevior, lobis rotundatis basi sese invicem obtegentibus ; stamina 7–8, tubo breviora, filamentis sparse pilosis. Ovarium lepidotum.

In cacumine montis Koua-la-po, prope Ho-kin ; 26 maj. 1884. No. 59.

Espèce intermédiaire entre le *R. anthopogonoides,* Maxim. et le *R. anthopogon,* Don. Elle diffère du premier par le tube de la corolle beaucoup plus court, et par ses feuilles atténuées à la base ; du *R. anthropogon,* pars ses fleures plus nombreuses, par ses filets staminaux poilus ; elle s'éloigne de l'un et de l'autre par ses fleurs blanches, par les écailles de la face inférieure des feuilles, qui sont très saillantes.

† Franchet in Bull. Soc. Bot. France, xxxiii (1886), 234. Franchet here adds :—

R. cephalanthum, Franch.—Folia subtus pilis agariciformibus dense vestita.

broad fringe is fimbriate; the shorter scales have incomplete disks in all degrees. The second year shoots are darker green and the long scales more separate. In the third year the shoots are brown and many or most of the long scales have now lost their disk and the stalk alone remains as a short seta—a procedure strikingly characteristic of this plant and its allies—a year or two thereafter the grey outer surface of the branch peels off. Foliage-bud outer scale-leaves about 6 mm. long and at base 2 mm. wide tapering from base to a sharp point prominently keeled lepidote on back and margin puberulous inside, innermost scale-leaves oblong spathulate about 1.4 cm. long 3 mm. broad lepidote on back where is a prominent midrib with long cilia on margin and puberulous inside; all foliage-bud scale-leaves arise at about same level and are persistent becoming woody so that bases or annual growth on the branches are marked by rosettes of woody scale-leaves. Leaves stalked as much as 4 cm. long; blade thick and leathery about 3.5 cm. long and 1.5 cm. broad spreading nearly at right angles to stalk which is at first adpressed later acutely diverging oblong obtuse with mid-nerve running out into a mucro which is recurved and making leaf appear somewhat emarginate, margin somewhat cartilaginous roughened by bases of fallen setae occasionally one or two setae remain (margin of young leaves setulose), base broad with rounded lobes not cordulate; upper surface convex in young leaves grey with peltate scales hardly contiguous in older leaves dark green shining showing traces of fallen scales and often over the sulcate midrib setulose from scale-stalks, primary veins on each side of midrib about 7 and sulcate at origin; under surface of young leaves pale yellow green of old leaves a dirty fawn colour densely clad with a persistent scurf of long and shorter peltate scales the longer with broad disks slightly separate from one another covering the shorter ones below, the midrib elevated at first concealed by scales later pale straw-coloured and sparingly lepidote, other venation hidden; petiole about 5 mm. long stout scurfily lepidote like stem and leaf under-surface. Flowers white some 8–10 racemosely arranged in small head-like terminal trusses upon a lepidote rhachis the whole inflorescence immersed in the precociously developing leafy shoots from below the inflorescence; outer bracts fulvous brown crustaceously leathery broadly ovate or rounded about 6 mm. long and 4.5 mm. broad somewhat truncate and abruptly apiculate lepidote on back and ciliate at margin; the fertile bracts obovate or subspathulate hooded about 1 cm. long and nearly 5 mm. broad somewhat membranous yellowish densely lepidote outside and ciliate with contorted hairs at margin puberulous inside; bracteoles as much as 8 mm. long not equalling calyx and 2 mm. broad spathulate greenish

yellow lepidote above and ciliate ; pedicels as much as 4.5 mm. long lepidote. Calyx campanulate green membranous as much as 7 mm. long cut almost to the base, lobes subequal ovate acute lepidote on back and ciliate with twisted hairs largest lobe about 3 mm. broad. Corolla oblique about 1.8 cm. long with a tube about 1 cm. long glabrous outside villous inside expanding into a limb with 5 crenulate imbricate lobes rounded somewhat fleshy and about 5 mm. in diam. Stamens much shorter than corolla tube about 6 mm. long the filaments dilated at base and there puberulous, anthers oblong about 1.5 mm. long. The ovary is about 2 mm. long and coated with yellow scales all over and the style is only about 1 mm. long.